

May 7, 1962

B578

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gem

1. CONTROL STUDY OF SA-5: This study has determined the feasibility of using accelerometer control on SA-5. This is now the preferred mode. The Q-ball alpha-meter is still available as a back-up. Another result is that the present North American steel abort tower design (weight = 5800 lb, cantilever frequency = 3.9 cycles/sec) has been accepted and MSC was so informed on the 30th of April. The use of either alpha-meter or accelerometers on SA-5 is contingent on obtaining early test data from the dynamic testing of the SA-5 vehicle. ✓

2. SA-2 EVALUATION: The SA-2 engineering evaluation is progressing on schedule (see Bulletins). No significant deviation or malfunction has been detected yet. ✓

3. VISIT DR. GATES, MR. WATKINS: Dr. Gates & Mr. Watkins, who are temporarily at Washington Headquarters, visited us and we discussed guidance problems in connection with Apollo mode selection. I outlined our LOR automatic guidance descent study and pointed out that such a system might, without much sacrifice, be made compatible with a fully automatic lunar launch of C-5 type. They were quite interested in this idea. Dr. Gates emphasized that he was not satisfied with studies of trajectory analysis and midcourse correction schemes at MIT & MSC and that he felt one agency ought to look at the whole thing. He also commented that we would be well qualified to do so. To him the MIT quotes on lunar ephemeris determination appear quite optimistic. Dr. Gates plans to return to JPL soon. ✓

4. LOR STUDIES: Work on automatic lunar launch scheme proceeds in close contact between Astrionics and Aeroballistics Divisions. We will need at least until the end of May or the middle of June before we have concrete data and hope to find a reasonably simple scheme based on inertial equipment and our lunar beacon, which will be compatible with lunar manned mode and also usable for a completely automatic launch. Δv budget will go up compared to MSC values. We asked Mr. Schramm to look closely at weight figures for LEM and SM. He said he did a substantial amount of work for NOVA. A clarification of priorities appears in order. ✓

What?
gem

5. APOLLO CAPSULE WEIGHT REQUIREMENTS: Ames seems quite willing to air the subject of Apollo capsule weight requirements and make a pitch for the modular concept. We will explore this further together with Mr. Koelle and Mr. Schramm. ✓

Wilson Schramm

Joe Skea wants our findings for both modes on same target date (15 June). Is this unrealistic to ask? B

1. RENOVATION AT MICHLOUD

* a. General:

Initial modifications to the Michoud Plant are approximately 95% complete. This effort is scheduled for completion by June 1, 1962. ✓

b. Office Building:

Renovation work is finished. Installation of telephones is in progress. Marshall personnel will move to permanent quarters on May 7, 1962. Air Conditioning work is estimated to be 70% complete. ✓

c. Engineering Building:

Renovation work is still on schedule. This building is scheduled for completion by June 1, 1962. ✓

2. FEDERAL AVIATION AGENCY

a. NASA Headquarters informed Marshall that the FAA will grant right of immediate entry into the FAA Slidell Air Route Traffic Center Facility within a few days. NASA Headquarters will inform Marshall when this right of immediate entry is granted. At that time Marshall will need to work out the details of accepting the facility from the FAA. ✓

b. Southern Bell Telephone Company was advised on May 2 of NASA's intent to occupy the FAA Building in Slidell. Southern Bell was requested to provide service at the Slidell Building for about 450 people by June 1, 1962. ✓

* 3. GENERAL SERVICES ADMINISTRATION

Mr. C. D. Bean, Commissioner Federal Supply Services, GSA, visited the Michoud facility on May 1. The purpose of the visit was to become acquainted with NASA personnel in New Orleans and to discuss a proposal by GSA to establish a GSA store in New Orleans. ✓

4. OFFICE SPACE FOR BOEING

Letter was sent to Congressman Hebert, Democrat from Louisiana, relative to the proposed leasing of 40,000 square feet of office space for the Boeing Company in the Claiborne Towers. ✓

35/8

NO NOTES RECEIVED FROM DR. DEBUS 5-7-62

B5/8

1. SLIDELL BUILDING - The building recently acquired from the FAA was designed for the acceptance of fairly extensive electronic equipment. To convert the area, which was designed for the computers, recorders, etc., to engineering space would cost NASA about \$200,000. Much of the cost involved is in double decking the high ceiling area. Inasmuch as we have need for extensive modification to Michoud to provide a central computer center to serve both Boeing and Chrysler and the operations at the Mississippi Test Facility, it would seem logical to locate a centralized facility at Slidell. George Constan is contacting both Chrysler and Boeing to see whether such a scheme is acceptable and workable. ✓

2. SECRETARY OF COMMERCE HODGES' VISIT TO MSFC - The Secretary's visit went off very well. He was given a short briefing in the Conference Room, followed by a tour of the Manufacturing Engineering and Test Divisions. Neubert, Newby, Kent, Kuers, and Heimbarg also participated. The tour was followed by a luncheon at the Halsey residence and a tour of the HIC Building, NASA area. Secretary Hodges was the principal speaker at the annual dinner of the Huntsville Industrial Expansion Committee. My personal observations are: (1) He is not completely sold on the space program. He made only a passing reference to the space program in his speech via the Alabama Research Institute. (2) He did not display the usual courtesy and appreciation. As a matter of fact, he was a bit curt at times. (3) He indicated several times a need for better explanations of the space program to the public in general. In connection with the latter observation, I plan to talk to Bart Slattery re the practicability of a series of articles to acquaint the general public with the Advanced Saturn program, for example.

3. LOX PROCUREMENT - Our position to hold fast on the 50% set aside to small business has been upheld by the Washington office. Seamans took this position late Friday evening. I will notify Linde today. ✓

4. Brochure on MISSISSIPPI TEST FACILITY - We sent Senator Stennis advanced copies of the Brochure on the Mississippi Test Facility and our current plans for its operations. Senator Stennis wired for 500 additional copies. He tabbed the brochure as being "very informative". ✓

5. CONGRESSMAN JENSEN (Last Week's Notes) A copy of our report to Congressman Thomas, requested by Congressman Jensen, is attached for your review. ✓

1. NASA QUALITY PUBLICATIONS: The official copies of the NASA Quality Publications NPC 200-1, -2, -3, Edition April 1962, with the signature of Dr. Seamans arrived last week and are being distributed. One set should reach your office in a few days. Simultaneously the NASA Circular Letter No. 217, subject: "Integration of Quality Requirements in NASA Procurements", with the effectivity date April 30, 1962, is being distributed. This letter spells out the responsibilities of originators of procurement requests as well as the responsibilities of the contracting officer for quality requirements and furnishes procedures on how to do it. You will receive a copy of this letter with the NPC documents. It is anticipated that these clear-cut guidelines will help MSFC considerably in the proper preparation of procurement documents and will eliminate some of the misconceptions which existed in some of our Divisions on this subject. I consider the publication of these documents an important milestone in our effort which will help to improve the relationship among Divisions of MSFC and between MSFC and the contractors as well as between MSFC and the Government Inspection Agencies. ✓

2. S-IV STAGE: Mr. Buchele, the Manager for Product Reliability (which includes quality control) at DAC, and two members of his staff visited with me and my S-IV Project Engineer last week with the purpose to improve the quality control efforts on the S-IV stage. The visit confirmed (what had been detected already several weeks ago and for which corrective steps had been taken) that communication between the MSFC Resident Project Manager's Office which includes representatives of the Quality Assurance Division, the Manager for Product Reliability at DAC, and the Government Inspection Agency (AF) had been insufficient. A considerable improvement is expected as a result of this discussion and as the result of the placement of one more representative of this Division at DAC who received specific instructions on this subject when he reported to work in the Douglas plant in the last days of March. Mr. Buchele also discussed the slow procedure for approval of deviations and feels that MSFC's Resident Project Manager has not been given enough authority to handle deviations locally. Since this Division is not responsible for this, we shall take this up with the Saturn Systems Office for determination of the present situation and improvement if necessary. ✓

3. GENERAL DYNAMICS/ASTRONAUTICS: Mr. E. D. Bryant, Vice-President for Operations, San Diego, and four members of his staff visited with me and my Centaur Project Engineer last week to investigate how we operate at MSFC that SA-1 as well as SA-2 were successful. We had a very good discussion on the subject and, judging from the genuine interest of this group, I do hope that the willingness to respond which has improved considerably at GD/A during the last few months will improve further. The group plans to return for more details. ✓

7 ? B

Dr. von Braun /
Harry Gorman:
Is our 2 day
symposium
scheduled yet?
JLH

Don't know
Who was to
set it up?
Harry? B

5/8

B518

S.H.
should
appreciate
laying
a
through
(2 hr)
refining
the
principles
and ele-
ments of
MIT
guidance
training:
your
experience

B
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jam

1. APOLLO GUIDANCE MEETINGS AT MIT: Personnel of this Division attended (as observers) meetings #8 and 9 at the Instrumentation Laboratory of MIT during week of 4/30. MSC and NAA representatives also participated. A proposed schedule puts an open loop passenger guidance aboard SA-9; aboard SA-10 a passenger with limited control function was proposed and complete closed loop systems on SA-111, 112, and 113. Technical personnel at MIT were concerned because a hardware contractor had not been selected and stated this was two months behind schedule and has put a burden on them to meet schedules. A. C. Sparkplug has been awarded a contract for manufacture of gyros and Sperry is building the accelerometers. These units are Polaris type with minor modifications. Bids have been received for various other components (resolvers, encoders, slip rings, and torquers) but no award has been made. Several design changes were noted from previous discussions that were held. Most significant was repeaters and encoders have been added to each resolver pair for pilot display and platform torquing for reorientation. A second coordinate system defined navigation axis which is approximately 30° away from capsule vertical has been established requiring a resolver on outer gimbal to resolve middle and inner gimbal resolver signals. Requirements were established for tracking radar; tracking radar transponder with low altitude doppler radar antennas for lunar landing module guidance. ✓
2. UTILIZATION OF GE PERSONNEL: Mr. Sloan and his man Sink, along with Dr. Weyers, MSC, met with Fichtner on May 2 to discuss this subject with regard to carrying out the GE study contract within MSC and MSFC. An agreement has been reached whereby the GE personnel will study and document system integration procedures, the results of which will be the basis for writing the scope for the next phase of the contract. A memorandum to this effect will be issued from Sloan's office. ✓
3. SOLDERLESS WIRE WRAPPING FOR S-IVB GSE: Douglas is proposing the use of this technique which they claim affords high density packaging and maximum use of automation in the production of this hardware. MSFC has generally opposed solid wire in the fabrication of vehicle and GSE systems. An R&D analysis of this technique versus the slow, cumbersome, manual process should be immediately implemented, probably by Quality Division to ascertain the relative merits of this low cost, repetitive mechanized method for making wire-terminal connections. A decision by QUAL is required by 8/1 in order to prevent delays in the manufacture of the GSE. ✓
4. CENTAUR EDUCATION PROGRAM AT GD/A: Approximately 20 ASTR personnel will participate in this program during the week of 5/7. Program was established jointly by L&M and ASTR to introduce our people to the detailed engineering aspects of the vehicle in areas of ASTR mission assignments. ✓
5. STATUS REPORT ON C.S. MANPOWER STRENGTH: 904 authorized, 858 on rolls. Of 49 vacancies we have 26 commitments. ✓

B5/8

1. H-1 ENGINE TURBOPUMP PROBLEM:

The turbopump from SAF-3 engine; S/N H-1025 (had worst No. 1 bearing found to date), was disassembled and rebuilt, and then subjected to 1007 seconds total operating time without any bearing failure. Upon disassembly and inspection, the turbopump was found to be in good condition generally, and in particular, no damage occurred on the No. 1 bearing. This isolates the H-1 gearcase problem to a No. 1 bearing problem (as versus a gearcase problem). ✓

2. S-1-3:

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gam A short duration firing of S-1-3 is planned to be conducted either 5/18/62 or 5/22/62, depending on progress made on turbopump preparations. Each turbopump, after rebuild, will be thoroughly instrumented and cold flow tested to determine the condition of the gearbox and bearings prior to reinstallation in S-1-3 cluster. ✓

3. MARINE ACTIVITIES:

Barge PROMISE departed Cape Canaveral, 6 a.m., 5/6/62; scheduled to arrive MSFC, approximately 5/22/62.

(Reference, NOTES 4/30/62 Heimborg). Continuing investigations of high speed roll-on/roll-off ships show these vessels, with a minimum of modifications, can accommodate space vehicles 220 feet long and 55 feet in diameter. Mr. Newby notified of our interest in these vessels. ✓

4. FACILITIES:

(Reference, NOTES 4/30/62 Heimborg). Thanks for "Urgent Action" classification of this item. ✓

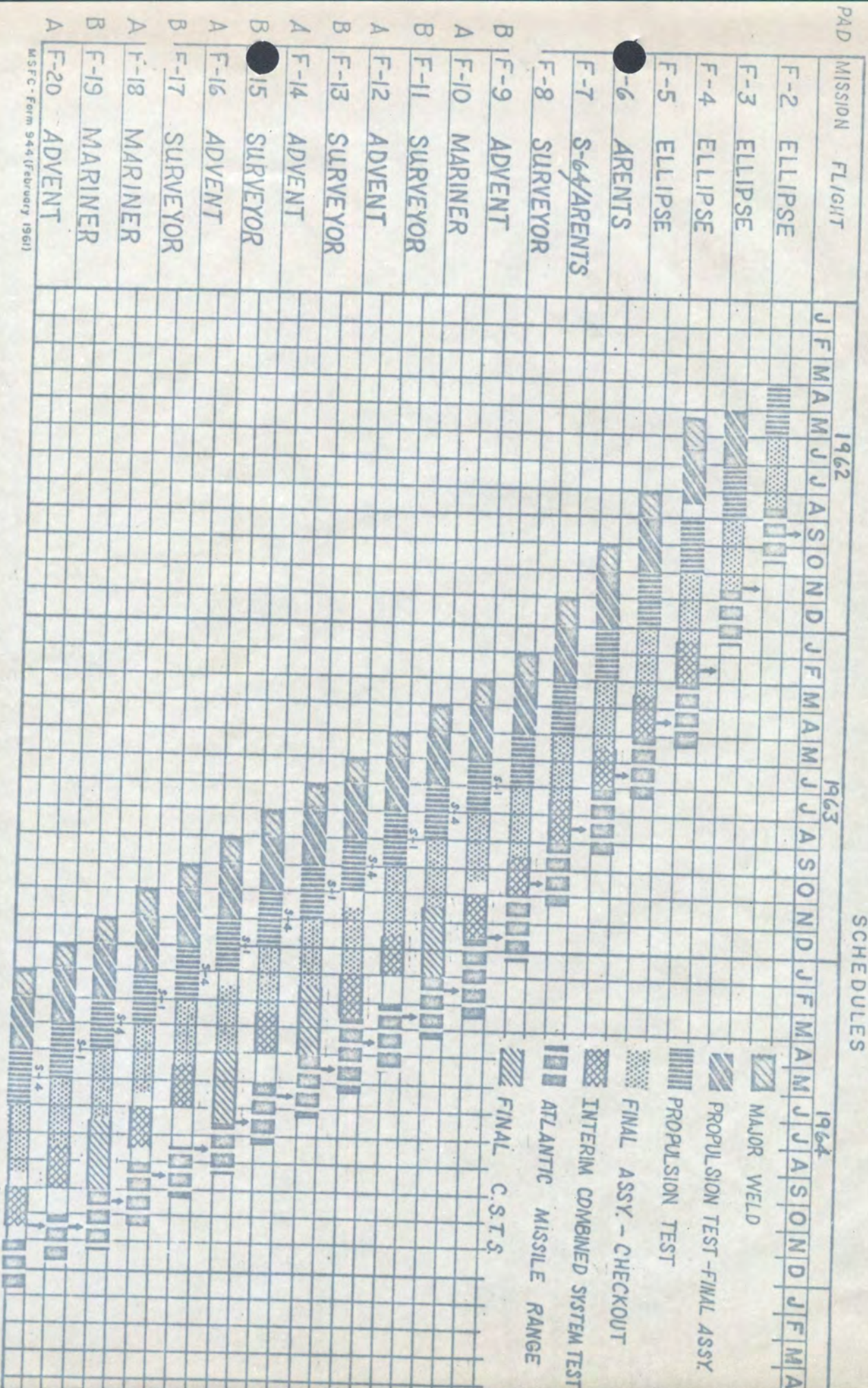
ATTACHMENT: NOTES 4/30/62 Heimborg

NOTES 5-7-62 HOELZER

B5/8

1. Negative report.

FLIGHT VEHICLES SCHEDULES



Current Tentative Schedule

FLIGHT Mission	PAID	CY 62			CY 63			CY 64		
Propulsion TEST	36 A	✓								
Propulsion TEST	A		✓							
Propulsion TEST	A			✓						
Propulsion TEST	A				✓					
TEST	A					✓				
TEST/ Aerobics	A						✓			
TEST/Aerobics 5-60 (Bus)	B							✓		
TEST Surreyork	A								✓	
TEST ADVENT	B									✓
TEST Surreyork	A									JAN 65

INTRA-COMPANY
CORRESPONDENCE

GENERAL DYNAMICS | ASTRONAUTICS

DATE 950-0-33
April 26, 1962

TO J. R. Dempsey

FROM G. L. Hansen

SUBJECT Centaur Program Progress and Problems

Eberhard KeesKurt Debus → (see also par. 6)

with reading! B 5/8

The purpose of this memorandum is to present a management summary of the most significant items of Centaur program progress and problem areas as of now, approximately two months after effecting our new project management organization. This information has all been previously discussed during our regular Centaur management meetings with you and Mort Rosenbaum, but is presented in this form for your distribution to the General Dynamics Corporation top management people who have requested that they be kept well informed on Centaur progress and problems.

Significant progress made during the last sixty days includes:

1. Establishment of the line project organization on a working basis.
2. Assumption of budget control for all contracts managed by the Centaur project.
3. Improvement of communications and working relationships among GD/A and NASA personnel.
4. Substantial improvement in the processing time for responses to NASA requests.
5. Identification of problem areas and solution or institution of means for solution.
6. Establishment of early identification to the customer for all problems known in our organization.

Although these items of progress are heartening, many problems still exist at this time. In my opinion, the following are the ten most significant Centaur program problem areas, and they are listed in the order of my appraisal of their relative severity:

GENERAL DYNAMICS | ASTRONAUTICS

950-0-33
April 26, 1962
J. R. Dempsey

1. Intermediate Bulkhead

This remains the major technical problem in the program because its solution has not yet been determined and demonstrated, and this item paces the entire program plan and schedule. This is also the largest single known item of overrun, and total costs cannot be determined until the exact solution is decided. Criteria for determination of when we have adequately performed to our specification requirements are now being developed to assure that minimum overrun funds are expended. We are vigorously executing a multi-solution design and testing plan for obtaining the earliest possible final solution to the bulkhead problem. This plan has received the technical approval of NASA MSFC.

2. Timely Contractual Direction

We have amply exposed to NASA the program impact of the lack of timely contractual backing for their technical direction to us. We also have a problem of wide divergence between MSFC and ourselves regarding interpretation of the scope of our existing contracts which were negotiated with the Air Force. Hans Hueter of MSFC and Cmdr. William Schubert of NASA Hq are well aware of the problem of lag in contractual coverage for technical direction and MSFC has indicated that an adequate solution to this problem is imminent.

3. Development of a Firm Program Plan

The Centaur program planning is made very difficult by such relative unknowns as the bulkhead solution, payload availability and payload requirements. Imposing upon the unknowns the restrictive boundary conditions of allowable launch windows for astronomical opportunities, availability of facilities, lead time for new facilities, program fund availability, and NASA Hq schedule desires makes any program plan a very tightly packed one with many assumptions in its prelude. If any one of these assumptions proves to be untrue, the entire program plan must be redeveloped. On March 12, 1962, NASA Hq released to MSFC their required schedules and their decisions to retain a common bulkhead configuration and to use a new third "kick" stage for 3-burn missions. NASA Hq has indicated that they will require a program plan based upon the March 12 instructions before they will release program funds. Key Centaur management people from GD/A, MSFC and NASA Hq, including K. W. Jeremiah, Deane Davis and myself, have been meeting almost continuously for the past several weeks to develop the plan, and it is to be officially presented to NASA Hq by MSFC on April 27. If approved and contractually implemented to us, we will then have the firm program direction which we require.

950-0-33
April 26, 1962
J. R. Dempsey

4. First Atlas-Centaur Launch (F-1)

The long overdue launching of F-1 has made this event of greater political than technical significance to many people. Further delays may affect schedules for subsequent launchings, and will damage confidence in Centaur and GD/A. The F-1 launch effort is receiving top project priority where required.

5. Guidance Sub-system

This problem has four parts: a) need for establishment of proper task and management relationships between GD/A, MSFC, LOD and Minneapolis-Honeywell; b) Guidance design adequacy; c) Guidance reliability and quality control; and d) M-H ability to produce adequate quantities of equipment and spares on schedule. A series of conferences between myself, Hans Hueter and Jim Healey, Vice President of Minneapolis-Honeywell, has established the policy to be implemented for solution of a, b and c must be solved mutually by Minneapolis-Honeywell, ourselves, MSFC Centaur Project and the MSFC Astrionics division. Minneapolis-Honeywell must solve d, but require approval of additional facilities. Proposals for these are now being processed.

6. Working Relationship with NASA LOD

Although considerable progress has been made in establishing a working team relationship with LOD at AMR, there are still some problems of conflicting philosophy and application of experience. We are gravely concerned that the price paid by the program for our complete acceptance of LOD detailed supervision and authority will be our inability to maintain a competent, experienced launch crew. One specific sore spot has been LOD disapproval of our operation of the AMR guidance lab. We believe this will be cured by assignment of the responsibility for operation of this lab to Minneapolis-Honeywell. In this and other areas, some personality conflicts have complicated the situation. These are being resolved, but we have the feeling that these problems should be considered as more of a mutual matter with LOD than a strictly GD/A problem.

*Kurt
Debus
F.Y.I.
and
comment
B
5/8*

7. Electronic Equipment Made at GD/A

Each Atlas-Centaur has at least 30 electronic "black boxes" designed and manufactured by GD/A. It was decided that for the present, at least, electronics effort would not be brought into the Centaur project organization but would operate as an in-house subcontractor. Difficulties are being experienced in providing electronic equipment on schedule and in obtaining reliable status information. Status and design of all electronic equipment is under review by the Centaur project. It is Centaur and Astronautics policy that program interests will take precedence over any desires to design and produce electronic equipment in-house. If schedules, quality, performance or cost can be improved by subcontracting equipment which we now make, this action will be taken. ✓

*→ Agree 100%!
B*

950-0-33

April 26, 1962

J. R. Dempsey

8. Need for Organizational Settling and Stability

Our new project organization has enabled a major improvement in responsiveness to NASA desires, but additional definition, refinement and staffing are necessary. In addition, we must now strive for maturity and stability of our team. On the NASA side, we see the problem for us of identifying to them those areas where our program is being adversely affected by lack of clear organizational direction and authority on their part. There are several of these areas.

9. Vent Valves

Hans Hueter
What are these areas?

Difficulties with hydrogen and oxygen vent valves has clearly indicated deficiencies in design and reliability. Redesign and testing are in progress. In the case of the hydrogen valves, this effort has been hampered by the lack of an adequate supply of liquid hydrogen in the country. This situation has now eased off. If the new designs prove out in test, the vent valve problem will disappear.

→ A 67 late to discover this now, eh? B

10. Hydrogen Peroxide Systems

The attitude control system and the boost pump drive system were adapted from other programs. For the Centaur program these two systems need to be redesigned and combined into one system for improved performance, lighter weight and higher reliability. A proposal to do this has been submitted.

G. L. Hansen
G. L. Hansen
Vice President and
Program Director - Centaur

cc: J. R. Dempsey for:

- F. Pace
- E. Johnson
- R. Lewis
- A. Gullander
- R. Biron
- H. T. Dillon, GD/Huntsville
- E. Hinz, GD/Los Angeles
- Cmdr. William Schubert, NASA Hqs
- G. Vila, GD/Washington
- J. P. Hammil, GD/New York
- E. Mathews, NASA, LOD
- H. Hueter, NASA MSFC
- R. Rovenger, NASA GD/A Plant Rep.
- J. Clark
- P. E. Brant, GD/Redbank
- Centaur Managers
- Astro Division Staff

B5/8

H.H.K.
Request
briefing on
what was
recommended
how pre-
sentation
was received
B

1. PRESENTATION TO Mr. HOLMES

Jim Carter and Louis Ball will make their presentation to Mr. Holmes on facilities on Tuesday, May 8, 1962. Dr. Rees will attend. ✓

2. STATUS OF FUNDS - FY 1962, FPO (ADVANCED CONCEPT STUDIES)
DATE: MAY 7, 1962

Authorized:	\$2,348,000
Committed:	\$2,171,763
Uncommitted:	\$ 176,237
Obligated:	\$ 284,150

P&C is the bottleneck in obligating these funds! ✓

3. LIGHT LAUNCH VEHICLES

You will recall that a study was performed by STL last year (Study of Medium Class Launch Vehicles), investigating merits of a "standardized launch vehicle," in the ATLAS-CENTAUR class versus continued use of vehicles based on THOR, ATLAS and TITAN. After discussions with Headquarters people, we have forwarded to Col. Heaton's office a follow-on study scope of work to follow up vehicle designs which looked attractive from the first phase study, and to look into possible future use of B-70 or supersonic transport type aircraft as reusable launchers for rocket-powered upper stages. We expect to include this work in our FY 63 study program. ✓

1. NEW PERSONNEL, CENTRAL PLANNING OFFICE - Mr. Lynn Bryant has accepted our offer of employment as Chief, Mgmt Analysis Office, to report about July 1. He is now Director of the Ordnance Management Engineering Training Agency at Rock Island Arsenal. He has a broad consulting experience in management which should be valuable to MSFC. ✓ *Would like to meet him*
2. PERT - Messrs. Smith and Clayton discussed PERT with Messrs. Briggs *after he* and Laurentz of MSC last week; and report MSC and MSFC are in close agreement on approach to contractor application of PERT/COST. Working with Michoud, we are developing PERT network on Master Plan for Michoud activation. *rept. in B*
3. MR. ANDRESSEN'S VISIT TO NASA HEADQUARTERS - Following discussions with Dr. Rees, we plan to:
 - (a) Look into methods for obtaining periodic personnel strength reports and forecasts from ~~major~~ prime contractors, to control buildup. ✓
 - (b) Request Mr. Newby to arrange for the investigation of problems of MSFC leasing an apartment in D.C. for liaison personnel on temporary duty. ✓
 - (c) Continue our efforts and influence on establishment of NASA Agency-wide management coding structure. The present draft generally follows current structure except for establishment of a new program for engine development. This was debated between the engine people and vehicle people; Mr. Rosen resolved the question by ruling for the new breakdown. M-SAT is opposed. *stay? B* Wiggins and Belew were both present. Mr. Belew feels that this is mandatory for him to manage his program in view of its long range nature. The new program is the best solution; it gives Belew the latitude he needs and funds can still be transferred with proper MSFC and headquarters control.
 - (d) Resume at a later date, the discussions with headquarters people on financial reporting and controls, as these will not be finalized for approximately one month. ✓
 - (e) Publish new MSFC Organization Chart showing consolidation of Legal and Patent Offices and LVOD. Mr. Webb approved our April 9th submission. ✓

In a meeting in OART, Mr. Boyd Myers of OART stated that there is still no feeling in headquarters on the amount of money NASA will get in FY-63. It is probable that funds will not be available on July 1 and that NASA will be provided funds under congressional continuing resolution which will allow expenditures, but may not allow for program emphasis desired. OART requested that we not submit a priority list at this time. *Mr. Mann, I am not marking your NOTES for Holmes TWX; otherwise I would have marked them. Jones-7*

4. PACIFIC LAUNCH OPERATIONS OFFICE - (Copy of 4-30-62 notes attached) *Jones-7*
 In discussion with Mr. Andressen, Mr. Rosenberry of OSS bought the MSFC comments on PLOO organization; this provides for a Manager of MSFC Operations at PLOO reporting directly to M-L&M. OSS proposed and Mr. Hueter tentatively agreed that the MSFC Manager also wear a second hat as Asst. Dir., PLOO. As such, he will be official PLOO representative for certain dealings with PMR. The Debus-Cody agreement is being re-drafted into a Debus-Hueter agreement, to include recent organizational changes. Test Director responsibilities outlined in present agreement remain unchanged.

B5-9

1. C-5: As a result of the P&VE Division C-5 Meeting held 5-2-62, the following Directive # 18 was released:

a. Propulsion and Mechanics Branch will expedite studies on C-5 Mechanical Automation and report in the C-5 Meeting in four weeks. (6-6-62) ✓

b. The machined "Y" Ring (Bulkhead Container Skin Intersection) approach will be adopted as recommended by the Structures Branch and The Boeing Company; however, two methods of manufacture will be pursued, one by electron beam welding, the other by fusion welding. ME Division will perform R&D in electronic beam welding and Boeing will perform R&D in fusion welding of the 5" thick 2219 Aluminum Alloy. ✓

c. Structures Branch will carry on parallel design of the cruciform and the ring-type baffle until 6-6-62. At this time, representatives of the Structures Branch and Aeroballistics Division will make recommendations from which a final design approach will be selected. (Preliminary weight comparisons indicate a weight savings of 6000⁺ pounds in the ring-type baffles versus the cruciform). ✓

d. The following design criteria will be used in studies and analysis pertaining to the C-5 Vehicle.

(1) An Isp of 424 for the J-2 Engine in a clustered status. ✓

(2) An Isp of 422 for the J-2 Engine in the S-IVB version. ✓

(3) A total mainstage, S-IC propellant weight of 4.4 million pounds including 30,000 pounds for propulsion performance dispersion.

(4) The thrust of F-1 Engine will increase by 75,000 pounds over and above that due to ambient pressure change. This is due to changes in pump inlet pressures under acceleration to be more effective than anticipated. ✓

Why that?
difference?
B

2. MATERIALS PROBLEMS: (Ref: Item No. 4 Notes Mrazek 4-23-62; Attachment No. 1). See Summary of Failure Analysis (Attachment No. 2). ✓

3. BOEING PERSONNEL: As of 4-4-62 the total number of Boeing personnel on board was 228. ✓

Attachment No. 1: Notes Mrazek 4-23-62

Attachment No. 2: Summary of Failure Analysis

B5-9

1. Occurrence: Hold-down arm bolt on VLF 34 sheared during torquing prior to SA-2 launch.
Status: Analysis complete; sampling of bolts in assembly and spares taken for study (7 bolts). Poor forging technique resulted in improper stress patterns and fold voids in head to shank fillet radius; radius was poor. Condition existed in all bolts studied.
Fix: Not serious enough to delay launch. Should replace with different alloy (A-286 stainless steel) for increased corrosion resistance and initiate stringent quality control and inspection over replacements. ✓
2. Occurrence: Partial breakdown of SA-2 heat shield.
Status: On-site repairs made without introducing launch delay. ✓
3. Occurrence: Sheared flare fitting threads resulted during fabrication of a filter assembly.
Status: Analysis complete; over-torquing during assembly caused thread shearing.
Fix: Follow proper installation procedures. ✓
4. Occurrence: Tearing of a screen filter contained in a GOX pressurization test assembly.
Status: Analysis complete; screen torn by sharp edge of filter retaining spokes.
Fix: Widen spoke material and remove edges. ✓
5. Occurrence: LOX boot strap line leak on H-1 engine 1041.
Status: Analysis complete; improper brazing of flexible hose to coupling unit.
Fix: Utilization of proper brazing technique in fabrication to insure complete flow of braze material as specified. ✓
6. Occurrence: Failure of 1½" GOX line gimbal during test.
Status: Analysis complete; very unsatisfactory penetration of the weld joining a retaining pin to its collar.
Fix: Utilization of proper weld technique. ✓
7. Occurrence: Series of LOX relief valve springs sustained permanent set during qualification testing of the valves.
Status: Analysis incomplete; metallographic and mechanical testing in progress.
Fix: (Temporary) Re-calibration of valves prior to service. ✓
8. Occurrence: Presence of inclusions in SA-5 sump flanges machined from 5456 aluminum at Chance Vought.
Status: Analysis incomplete; metallographic studies in progress.
Fix: Removal and replacement of flanges containing inclusions from SA-5 flight hardware, increased inspection of incoming new material and stricter control of primary mill practice. ✓
9. Occurrence: Corrosion and pitting found in sections of RL-10 engine tubing prior to engine manufacture.
Status: Analysis incomplete; metallographic studies in progress.
Fix: (Temporary) Thorough inspection of tubing prior to engine manufacture. ✓
10. Occurrence: Failure of No. 1 (LOX) bearings in turbopumps contained in H-1 engines 1025 and 1041.
Status: Analysis in progress; studies to date indicate that thermal contraction of bearing guides and installation damage are contributing factors.
Fix: (Temporary) Selection of bearings with maximum end play for flight hardware and detection of damaged units following firing by vibration and sound analysis. ✓

Mac
Suggest we send copy of this report along
as an attachment to our
next "Notes" to OMSF. B5-9

11. Occurrence: Formation of weld cracks in H-1 engine turbine exhaust hoods undergoing 188K service testing.
Status: Analysis incomplete; studies of ducts removed from 165K engines revealed poor weld quality and the presence of a notch effect in the bellows-to-duct joint.
Fix: Redesign of the hood and complete x-ray inspection prior to installation. Ducts on SA-3 and SA-4 will be x-rayed and retrofitted if necessary. ✓
12. Occurrence: Appearance of cooling tube cracks near fuel pre-fill level in five production H-1 engine chambers.
Status: Analysis incomplete: two engines experienced horizontal cracks that were attributed to localized over-heating. These engines were repaired and returned to service. Three engines experienced vertical cracks. Two were repaired and returned to service. The remaining engine sustained vertical cracks during testing subsequent to repairs and is, therefore, being subjected to R&D testing. The vertical cracks are presently being attributed to impingement of the hypergolic ignition fuel on the dry tube walls.
Fix: Satisfactory fix will depend on results of current test program, however, will probably consist of the achievement of proper igniter fuel spray patterns on all production engines. ✓
13. Occurrence: Fracture of the main structural tubes of the cable mast at ULF 34 occurred following lift-off of vehicle SA-2.
Status: Analysis incomplete; preliminary studies of the one tube section available for study at the present time indicate that partial fracture occurred prior to complete failure of the structure. Fracture appears to have originated at a fastener hole in the tubing.
Fix: Analysis has not progressed to the point where corrective action can be taken. ✓
14. Occurrence: Fracture of a tube sleeve during fabrication of a test assembly.
Status: Analysis incomplete; preliminary study has been initiated. ✓
15. Occurrence: Failure of a high-pressure pipe coupling during test.
Status: Analysis incomplete; preliminary study has been initiated. ✓
16. Occurrence: Corrosion of SA-5 propellant tanks manufactured at Chance Vought.
Status: Analysis incomplete but underway. ✓
17. Occurrence: Corrosion of bearing on pressure balance joint proposed for use in S-IC.
Status: Analysis incomplete but underway. ✓
18. Occurrence: Failure of high pressure spheres programmed for use in C-1 block II vehicles.
Status: Three spheres fabricated to date, all of which have failed in qualification testing. Materials and process changes have been recommended and are being incorporated into fourth sphere. Problem remains unsolved at this time. ✓
19. Occurrence: 70" tanks for SA-5, manufactured at Chance Vought have had questionable weld quality, and, in one case, a tank was shipped to MSFC which leaked.
Status: MSFC radiographic personnel were sent to Chance Vought to review x-ray specifications and inspection procedures. There are indications that quality control is not adequate. ✓
20. Occurrence: Ball Valve Body Castings were received from Parker Aircraft for qualification tests and were found to be slightly below acceptable radiographic quality limits. In addition, Parker has used an impregnation of sodium-silicote to prevent weepage under pressure.
Status: MSFC review of this situation resulted in directive to Parker to improve casting quality, by increasing wall thickness, if necessary. Pending additional tests, impregnation will be allowed only on the first group of parts. ✓

21. Occurrence: Pratt Whitney has requested permission to use a polyester resin impregnant as a common practice for all aluminum castings on the RL 10 engine. Status: We will test samples of the proposed impregnant for LOX impact sensitivity. Other mechanical tests will be made at MSFC and P&W to verify suitability of this procedure. Impregnation has generally been disapproved by MSFC. ✓
22. Occurrence: Feasibility study of coatings for titanium pressure spheres in LOX tank of S-IC resulting in approximately 2000 pounds weight saving. Status: Selected coatings applicable to titanium are under analysis to determine the effectiveness of such coatings to safely lower sensitivity of titanium to permit the recommendation to be incorporated. Solution expected but not available at this time. ✓
23. Occurrence: Failure of common bulkhead in S-IV during cold testing. Status: Analysis by DAC and MSFC has resulted in procedure changes during manufacturing. Problem remains unsolved at this time. ✓ ← *PLVE Please elaborate*
24. Occurrence: Review of DAC S-IV heat shield materials established certain inadequacies in development program. Status: MSFC has directed testing of all heat shield materials in combined environment of calculated thermal, mechanical, and vibrational environment. ✓
25. Occurrence: Failure of S-IV forward interstage skirt. Status: Under study at this time with no definite solution. ✓
26. Occurrence: Air Force proposal for siting of Titan III launch complex. Status: Extensive study of both explosive and corrosive/toxic environment hazards to which VLF 34,37, and 39 will be exposed is underway. ✓
- 112
... B 27. Occurrence: Excessive friction of Centaur gimbal bearings. Status: Calculations show that the friction in current gimbal bearings exceeds actuator capability under certain flight conditions. Investigation is underway to select a more satisfactory lubricant.
28. Occurrence: LH₂ Properties Standardization. Status: Critical review of all values for the properties of LH₂ is underway on a highly urgent basis in order to provide all SATURN contractors with common data. This is being co-ordinated with industry, contractors, NBS, and NASA-Lewis. Thermodynamic data have just been recommended; transport properties are now being examined. ✓
29. Occurrence: Corrosive atmosphere associated with vehicle assembly at Michoud Ordnance Plant. Status: Intensive survey of precautions which must be incorporated into assembly procedures by contractors operating in Michoud. Complete solution is not available at this time. ✓

1. Selection of Mission Mode.

Douglas Lord (Asst. Dir. for Mission Planning) in Shea's Office is working hard in this area with inputs from Rosen and Low. ✓

2. Schedules.

Are also tackled by Lord with inputs from same people. Questions like the following are raised:

Why fly several 1st stages (as in C1) before adding 2nd stage etc. ✓

Why not fly in following pattern:

1st Stage - If success, add

2nd Stage - If success, add

3rd Stage.

Or even "better":

Fly all 3 stages in 1st try (like Minuteman)

If success - add Spacecraft

If success - let Astronaut(s) decide (in lunar circumnavigational flight) whether to land on moon or not.

You know as well as I, how many questions of such nature "the uninitiated" can ask.

3. Environmental Conditions and Safety Factors.

Mr. O'Neill (Asst. Dir. for Design Standards & Reliability) of Shea's Office calls on my office for support in above areas. ✓

JPL Group didn't give him much, we do. ✓

In nutshell: I said we (Office of Systems) establish, based on today's knowledge, natural environmental conditions (and request actions for improvement) as requirements to be met by designer. Induced environment and safety factors as margins leave to designer, but let designer prove through testing he has safety factor as margin. ✓

Lead time problem !!!
(both for find itself and launch facility)

H.R.

I guess the right answer is somewhere in between these two. For example: Only 1 or 2 single - stage flights. Details depend mainly on stage availability! In C-5

at present we plan 2nd stage in flight #2. B

re-word considerably

*1. SUPPORTING RESEARCH: Mr. Miles, Mr. Downey and I visited OART on May 2 to discuss the FY-1963 MSFC LVT Program Requirements. Dr. Rees was present part of the time. The primary purposes of our visit were to make personal contacts within the OART Program Offices, to attempt to obtain some indication of the level of support that we could expect from OART in FY-1963, and to discuss interim funding requirements for the early part of the fiscal year. We made an interim funding submission (4.492M) covering the period from the present time through September 15. Our request was based on the assumption that our total programmed FY-1962 funding for LVT (10.863M) would be used before July 1, and that the FY-1963 NASA budget would not be firm before September 1.

In the morning session of our meeting general questions were discussed; in the afternoon we met with groups from the individual OART Program Offices to discuss our FY-1963 program requirements in more detail. The OART people were quite complimentary of the detail shown in our March 15 submission (FY-1963 Supporting Research Program Requirements) and praised us for our effort and our willingness to cooperate. They even encouraged us to increase efforts in certain areas. As might be expected, in view of the fact that the overall NASA FY-1963 budget is not yet firm, no budget commitments could be made by OART. ✓

2. RESEARCH INSTITUTE: A rough draft proposal for the Research Institute was received from the University of Alabama. The draft will be reviewed here by Dr. Shelton and me and then rewritten in a mutually agreeable form. The final proposal will be forwarded to Dr. Kurzweg's and to Dr. Small's office for consideration and action. ✓

3. MR. HELLER'S TRIP TO EUROPE: Mr. Heller presented a paper "U.S. Launch Vehicles for the Peaceful Exploration of the Universe" at the Milan Congress of "Man and Machine in the Nuclear and Space Age". Among other aspects, the congress covered latest plans on the Eldo vehicles and other European satellites, launch vehicles, nuclear power stations and space medicine. A detailed trip report is being prepared. Mr. Heller also held a seminar on arc propulsion with a group of German research institutes and industrial companies interested in electric propulsion and in space exploration in Munich, Germany. ✓

4. ELECTRIC PROPULSION: The transfer of MSFC electric propulsion contracts to Lewis Research Center has been completed; forty-six contracts were transferred. Five active contracts are being retained by the Research Projects Division.

Astrionics Division is completing their activities in support of the electric propulsion flight test effort. Dr. Haussermann and his people have been of great assistance both to RPD and, more recently, to LeRC. Astrionics Division certainly played a major role in the planning and preparation of the early flight testing of electric engines. Their cooperation has been greatly appreciated. ✓

5. FY-1962 LVT PROGRAM: Mr. Ray Parsley from RPD joined P&C temporarily to assist in the finalization of contract actions for our LVT program. ✓

B5-7

1. M-1 ENGINE PROGRAM: The letter contracts for the R&D effort and the Facilities for the M-1 program were signed by MSFC on 4-27-62. They were accepted by Aerojet on 5-3-62. ✓

* 2. H-1 ENGINE PROGRAM: The \$950,000 authorized for reprogramming in the fourth quarter review has not been provided. These funds are urgently needed to initiate contract for operational vehicle. ✓ *Mac Suggest U.A. item!*

3. RL10 ENGINE PROGRAM: The first engine with a Connecticut-fabricated thrust chamber has completed approximately eight firings with no difficulty. The RL10-A-3 PFRT engine (Fx146) is being assembled. The parts are under-going government inspection.

New vertical test stand E-7 is complete; an engine has been mounted for test stand checkout. ✓

* 4. J-2 ENGINE PROGRAM: Engine Tests: Engine J001 was removed from the VTS-3B position and returned to Canoga Park for replacement of its injector which was damaged during run 037. Cause of injector damage was attributed to overheating of the augmented spark igniter (ASI) which resulted in subsequent burnout of the injector face around the ASI discharge exit. Engine has been reinstalled in the VTS-3B position; however, all engine testing had temporarily been stopped by MSFC pending the investigation of a LOX turbopump explosion.

LOX Turbopump Explosion - An explosion of LOX turbopump E-005 occurred 4-27-62 during component testing of the pump scheduled for 250 seconds "green run." The cause of the explosion was attributed to, in order of probability: heat generated by excessive friction in the area of the forward carbon seal ring; rubbing and chatter between the inducer, the impeller and the shaft due to material shrinkage at cryogenic temperatures; and LOX contamination. Damage was estimated at \$10,000 to the facility and at least two weeks are required to repair the facility before testing can resume.

The third test on the regeneratively cooled thrust chamber (hand brazed) on test stand VTS-1 was run on 5-2-62. This test was terminated by rough combustion cutoff shortly after reaching mainstage. Visual inspection revealed several tubes had been deformed and the braze material was cracked in the combustion chamber approximately 1½ inches down from the injector face and approximately 4 inches long. The injector was not damaged. The thrust chamber has been returned to the Canoga plant for further inspection and possible repairs. ✓

5. F-1 ENGINE PROGRAM: The wide baffle injector has experienced instability in recent tests and as a result the next few R&D engines will have the flat face 005U pattern.

The Rocketdyne-designed actuator and servo valve (non-flight weight design) for demonstration of gimbaling are undergoing tests and promise to meet all requirements. ✓

6. H-1 GEARBOX AND BEARING PROBLEM: This SA-3 problem, reported earlier, seems to have been reduced to a quality control problem. We will let SA-3 and SA-4 proceed now. SA-5 actions (188K) still being discussed. ✓

May 14, 1962

1. RENOVATIONS AT MICHLOUDa. General:

Initial modifications to the Michoud plant are approximately 95% complete. This effort is scheduled for completion by June 1, 1962.

b. Office Building:

(1) Renovation work - completed.

(2) Air Conditioning System - 85% complete. ✓

c. Engineering Building:

Scheduled for completion by June 1, 1962. ✓

d. Boiler House:

Completed. ✓

* 2. MR. WEBB'S VISIT TO MICHLOUD OPERATIONS

Mr. James Webb, NASA Administrator, visited the Michoud Operations on May 7, 1962. He was given a drive through tour and a general briefing of the facilities. His questions were generally related to the physical characteristics of the plant. His visit was of about 30 minutes duration. ✓

F.C. He told me he liked what he saw! B

3. USE OF MICHLOUD CANAL

Mr. Gorman and Mr. Guilian will visit the New Orleans East Incorporated in New Orleans on May 17, 1962. Purpose of this visit is to discuss NASA use of the Michoud canal which is owned by New Orleans East. ✓

4. PICKET INCIDENT

Two pickets from Teamsters Local Union picketed the Michoud main vehicle gate from 9:00 a.m. to 3:50 p.m. on May 7, 1962. They were protesting against Braswell Freight Line trucks delivering furniture to the plant. This incident was reported to MSFC Labor Relations Officer. ✓

* 5. COMPUTER FACILITIES

Favorable comments were received from Boeing and Chrysler on installing the computer and data processing equipment in the FAA Building in Slidell. Subsequently, it was decided that MSFC should use this facility for the Central Computer Center. ✓

6. OFFICE BUILDING CONSTRUCTION IN MICHLOUD AREA

In a letter to Chief, M-P&C on May 11, 1962, the Manager of Michoud outlined the projected office space requirements and the need for an office building to be constructed in the vicinity (within 0.5 miles from the front main entrance) of the Michoud plant. It is estimated that 373,200 sq. ft. of additional office space will be required by January 1964. ✓

Could this be a C of F project, or can we incite private business to build it and rent it to our contractors? B

Forget it → (I just found answer in Harry Gorman's Notes) B

Bob Hines:
One page, please.
BS/ib
Jan 5-15

1. Holmes' Visit. Holmes arrived today for a two day visit with me. I plan to go into detail concerning the organization problems as well as other general areas concerned with the mission statements from Hqs. about the LOC. In addition to my meeting, General Davis had called Holmes and asked for a private meeting which has been arranged for today. I will advise you later in the week concerning the status of both meetings. ✓
2. Disagreement Areas of Separation. Major areas of disagreement are:
 - a. Division of personnel, particularly in support areas and Sandler's area.
 - b. Functions of instrumentation and flight control.
 - c. Channel for budgeting and funding for LOC program-oriented areas (whether direct from NASA Hqs. or through MSFC to LOC). No action required. ✓
3. GSE. A meeting was held with Mr. Mrazek May 4 to implement the following agreements of the April 26 meeting held at LOD with you (et al) on GSE.
 - a. "Those panels such as valve panels which are identical to be provided by the stage Center will be furnished to LOC for installation and integration. LOC will concur in the design of such equipment. Modifications after installation will follow similar procedures. The stage Center will budget and fund for these panels and modifications.
 - b. "The male and female portions of missile disconnects will be considered stage peculiar. Non-functioning couplings that connect the stage related equipment and the LOC facility items such as swing arms, will be by mutual agreement. This interface point will be as close to the vehicle as technically feasible." ✓
4. Saturn. Investigations are underway at the present time to see if it is possible and practical to utilize an umbilical swing arm for SA-3 launch in place of the long cable mast. The shipping date of SA-3 is the deciding factor of how many problems we will have. If SA-3 slips two weeks for arrival here the end of August, then there should not be any problem. ✓
5. Centaur. The apparent cause of the failure in the Centaur stage on the Centaur F-1 vehicle is being evaluated in detail at LOD and the GD/A organizations. An investigating committee arrived at LOD today to go into detail concerning the entire program. The investigating committee is working in connection with the same Congressional hearing that you will attend tomorrow. Over the weekend we forwarded two sets of "still" pictures taken from tracking cameras as well as other films requested by Hueter's office, for your information concerning the flight. *We showed them to the Cong. Committee*
6. Jupiter CTL. Jupiter Missile 111 has arrived and is undergoing pre-erection preparations in Hangar R. Erection is scheduled for the first week in June. ✓
7. AFMTC/NASA Relations. General Davis has held two meetings with the AFMTC Staff recently concerning AFMTC/NASA relations. He has reiterated that AFMTC has a service to perform. He further stated that the attitude with which this service is performed has an important bearing on relations. ✓

NOTES 5-14-62 DEBUS (Continued)

8. Visit of the Prime Minister of Norway. The Prime Minister of Norway was here Friday and Saturday via State Department invistation. ✓

B 5/17

1. TRACKING PROBLEMS RE: LOR STUDY: Drs. Vonbun and Siry, GSFC, were invited to discuss tracking problems in connection with the LOR study for Dr. Shea. F. Speer and F. Kurtz participated in the meeting. GSFC will propose 200 km as minimum parking orbit altitude. This is based on both orbital lifetime and tracking which in turn includes power flight, orbit, and check out. Injection accuracies from ASTR were accepted as common basis for tracking accuracy studies. It was agreed to propose ground tracking and command as primary guidance input for the escape burn (on-board measurements as back-up). ✓

Additional discussions concerned orbital tracking of Saturn Block II flights and the seemingly universal problem of responsibilities for tracking and data acquisition within NASA. GSFC feels itself more or less in charge of all future NASA tracking tasks. ✓

2. S-IV-6 ENGINE BASE HEATING TESTS: The S-IV-6 engine base heating tests have been completed at Cornell Aeronautical Laboratory. A presentation was given at the P&VE C-1 meeting on May 8, 1962, summarizing the 6 engine results and additional data obtained on S-IV - 4 engine configuration such as heated base plate measurements and Reynolds number tests. Comparison of 6 engine vs 4 engine configuration results indicate somewhat higher pressures and heating rates on the 4 engine configuration. Recovery temperatures of 1/2 to 1/3 of combustion chamber temperatures were observed. Film coefficients vary from .005 BTU/ft² sec to .001 BTU/ft² sec for the 4 engine configuration. Radiative flux from hydrogen - oxygen flame is so small as to be unmeasurable with the instrumentation used in these tests. Some additional tests will be made with the six engine configuration to determine the choking altitude (which appears to be approximately 180,000 ft) more accurately. This is of no interest to the designer, however. ✓

E.g. What are potential detrimental effects of this for MSFC? for help & service where we can get it? B

2. 0 3. LAUNCH PAD LOADING STUDY: A meeting was held with representatives of LRC, P&VE, and Aeroballistics Divisions on the launch pad loading study based on ground wind measurements. Plans are to employ existing strain gauge and accelerometer instrumentation on SA-3 with existing lower response (1/2 cy/sec) wind equipment to obtain preliminary estimates. Detailed analysis will require instrumentation of higher response (5-10 cy/sec) wind equipment on launch pad. This equipment is presently being investigated by Aeroballistics and LOC. ✓

4. INDUCED WIND LOADS: On-pad wind loads wind tunnel programs have been discussed with representatives from Langley Research Center, P&VE Division, and Aeroballistics Division. Both the C-1 and C-5 wind tunnel programs were discussed. It was agreed that these tests are necessary and urgent. Aeroballistics Division will proceed with the necessary arrangements. It will be necessary to transfer \$100,000 to Langley Research Center to cover cost of model design and fabrication. The Saturn Systems Office has been contacted to see if \$50,000 can be made available out of FY-62 funds for the C-1 program with \$50,000 for the C-5 program being made available as soon after July 1 as possible. It is planned to begin wind tunnel testing shortly after January 1, 1963. ✓

2m

OFFICE OF DIRECTOR

MSFC ROUTING SLIP

	CODE	NAME	INIT.	<input type="checkbox"/> A C T I O N	<input type="checkbox"/> I N F O R M A T I O N
1	M-SAT-DIR	Dr. Lange			
2					
3					
4					

REMARKS

Please note Dr. von Braun's comments to my
NOTES attached. (*Item 4.*)

In view of our meeting today with the Chrysler people, von Braun's wishes should be implemented by the Saturn Office as a part of your negotiations with Chrysler on the scope of work. Rees has indicated a need for a meeting with the Division Directors on this subject. Again, I believe you should not only prepare for such a meeting, but determine its timing compatible with your time table in working out the Chrysler scope of work.

Harry

CODE M-DEP-ADM	NAME Gorman	DATE 6-4-62
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1. ENGINEERING AND OFFICE BUILDING - MICHLOUD - We expect Chrysler to move out very shortly to invite private firms to propose on an office and engineering building. This building, to be located close to the Michoud plant, will house the Chrysler personnel as currently projected. Chrysler will make appropriate leasing arrangements with the builder. MSFC will provide appropriate language in Chrysler's contract. Once completed, the building will house all Chrysler personnel except those occupying the manufacturing area, and thus, the Boeing Company and MSFC personnel will occupy available engineering and office space in the Michoud plant. ✓ *Sounds like a very good solution!*

2. CONGRESSIONAL INQUIRIES - It may be of interest that during the month preceding May 11, Marion Melton processed 80 letters and teletypes as a result of Congressional inquiries. About half of this number was in connection with the Michoud and Mississippi Test operations. Congressional interest in Marshall's activities is steadily increasing. ✓ *Let's put this, properly recorded, into Notes to OMNSF.*

3. LEVEL OF EFFORT CONTRACTS - The General Accounting Office is now auditing the level of effort contracts with Brown, Hayes, and Chrysler. This is in accordance with Teague's interest in having the NASA contractors activities audited by the GAO. A similar audit is going on in other areas. ✓

4. CHRYSLER CORPORATION - On May 9 representatives of Chrysler were in my office. Smith and Trahern expressed concern that Chrysler may not be able to participate in furnishing engineering support to MSFC beyond September 30, at which time the work now being performed under the Chrysler level of effort contract will be phased into the definitive contract. I told Smith that Marshall intended to hold Chrysler responsible for the scope of work identified in the request for proposal and to be identified in the final contract and that we have no commitment to Chrysler for any work that would fall outside of the S-1 scope. Further while Chrysler is free to propose on any requirement for which they qualify, from a policy view we do not favor stage contractors providing engineering support except as required under the mission contracts.

→ H. G. Seems to be the only sound & correct position for us to take. Suggest, however, that we make sure all MSFC divisions involved understand this clearly. They should be given a chance (in fact: they should be specifically invited to) identify all remaining engineering support in the S-1 plus C-T systems work area for inclusion in the definitized contract. Unless we do that, I expect a full-fledged fire alarm in September. B

BUDDIE
TWX
5/22 pm

Urgent →
GORMAN
Action

Yin

B5-18

1. SYSTEMS CHECKOUT AND PREFLIGHT TESTING WORKING GROUP: The follow-up meeting with DAC regarding post-static checkout procedures and other items was re-scheduled for May 15 & 16. At this time it is expected that DAC post-static checkout will be brought into line with MSFC thinking. Further discussion is planned concerning *RFI testing which appears to be a problem area at this time.

Meeting with DAC involving some members of the working group on S-IVB Automation Plan resulted in the possible reduction of computer requirements. Investigation is being conducted as to whether component testing by automatic means is practical. DAC Automation Plan is very elaborate. Definite attempts will continue to be made to reduce this elaboration.

D.G.
Not as
this con-
sidered
with Ficht-
ner and G.E.
B.

2. CENTAUR: Some difficulty was experienced regarding Air Force review of subcontracts from GD/A for quality assurance provisions and delegation of source inspection by government agencies when required (in accordance with NPC 200-1). A temporary solution based upon verbal agreement has been effected and a permanent arrangement will be made soon. ✓

3. PRATT & WHITNEY RL-10 ENGINE: Engine 1728 is presently undergoing receiving inspection at Quality Assurance Division utilizing checkout procedures intended for final checkout prior to shipment from Pratt & Whitney. ✓

D.G.
What's
your
general
impression?
B

4. S-I-3 TURBOPUMP INVESTIGATION: All engines removed from SA-3 for turbopump investigation have been accepted after rework and released for installation. ✓

5. RECEIVING INSPECTION: Receiving inspection of standard mechanical items, such as fittings, fasteners and other standard hardware, has been established in Technical Materials Branch. ✓

*Radio Frequency Interference

Jan

1. STATUS REPORT - CENTAUR GUIDANCE & CONTROL WORKING GROUP. Highlights of the group meeting of 5/3-4 are as follows:

- a. Replaced fixed wiring with electrical plug connectors for each attitude engine. Engines have to be removed numerous times at launch site, thus a plug will eliminate continuous soldering processes. Electrical plugs have been added between adaptor section and Atlas stage. This will eliminate long tedious wire soldering; and if stage is removed, wires will not have to be cut and resoldered in field. ✓ *Typical result of sloppy procedures planning on the part of GD/A. This was predictable.*
- b. Study has been initiated at GD/A to eliminate all wire splicing and to add electrical distributors. *same thing!*
- c. The present 400 cps static inverter is rated at 300 VA with 50% overload capability for a 10 minute duty cycle with a 30 minute cool-off period. Present load requirements are 374 watts. Future load will be 451 watts. A new requirement specification has been established for a 600 VA static inverter which will be required in F-3. ✓
- d. Changes in gyro drift characteristics after an AC power transfer results in incorrect gyro drift compensation values stored in the computer. Condition requires that all AC pre-launch power be taken from the flight power supply leaving them only DC power supply to be transferred. Power requirements to operate the guidance equipment continuously with airborne power supply is now being reviewed. *GD/A could have discovered that 2 years ago!*
- e. Status of guidance hardware is still very discouraging. To date we have flown two systems. There is one system at AMR. The remainder of the systems are at Honeywell - St. Petersburg - for repair with varying troubles. Overall schedule program has continually slipped and no reasonable schedule can be kept. *Hans Hueter - All this sounds awfully sobering!! Any comments?*

2. INSTRUMENT UNIT LAYOUT - During recent weeks personnel representing M-ASTR, M-P&VE, M-RP and DAC have held a series of meetings concerning the Instrument Unit (IU) layout, thermal design and auxiliary power concepts for the S-IVB. The greatest problems to date have been in the area of establishing coordinated working arrangements in the thermal design and packaging areas. The problems are closely linked to the lack of coordinated viewpoints, mission concepts, and system policies. *W.H. Let's bring all these problems into focus during forthcoming I.U. meeting. That's precisely what must be snuck out first.*

3. ARC JET ENGINE SYSTEMS TEST - Test of Plasmadyne's arc jet engine with power supply developed by Fichtner's branch was conducted on 5/3-5 at Lewis Research Center. Overall performance appeared to be satisfactory; however, evaluation of recorded data must be made before final analysis of power supply influence on engine performance can be made. The Plasmadyne people indicated that they would possibly desire one more systems test in conjunction with MSFC before final transfer of responsibility to Lewis. *being half-cocked.*

4. FUEL CELL R&D CONTRACT - Contract has been negotiated with Allis Chalmers. It covers only the initial phase of the development. *W.H. There's a NASA contract with United Aircraft and another one w/F.E. Why do we need a 3rd one?*

5. STATUS OF FLIGHT SIMULATION FACILITY - Plans for second phase of work have been prepared jointly with M-COMP. This phase covers the simulation of line-of-sight motion. ✓ *Ur-gent!*

B5-18

1. S-1-3 ACCEPTANCE FIRING:

Short duration firing is planned for 5/18/62; long duration firing is planned for 5/25/62, with removal from the stand on 6/5/62. ✓

2. LOX PUMP BEARING PROBLEM:

Nothing new from this end at this time. Report covering the whole situation is in preparation. Firings of S-1-3 will be completely instrumented. ✓

* 3. MARINE ACTIVITIES:

Jan Barge PROMISE departed Fort Pierce on Monday, 5/7/62, at 3:45 p.m., and arrived at mouth of Mississippi River at 4 p.m., 5/11/62. Average speed trans-Gulf, 7.6 knots. Open waters tow made without incident. Vessel scheduled to arrive at MSFC, Friday, 5/18/62, p.m.

The costs for modifying the railroad car ferry "Grand New Haven" is estimated to be \$380,000.00. This will retain the vessel's classification status with the American Bureau of Ships and provide a covered cargo compartment large enough to accommodate a C-5 vehicle. Larger boosters can be transported with further modification.

4. RL10 ENGINE:

RL10A-1 engine, S/N 1728 (first hot firing) was received from Pratt & Whitney Aircraft on 5/4/62. Engine is now at Quality Assurance Division. Scheduled to be returned to Test Division on 5/14/62 (today) for installation in Stand, Test Cell "C", for cold flows and hot firing. ✓

*K.H. of the Cuba ferry? What's status of purchase
New Haven "one of them"? "Grand New Haven" ? B*

NOTES 5-14-62 HOELZER

B5-18

Negative report.

B5-18

1. CENTAUR:

a. F-1: Centaur Vehicle F1 was launched from Complex 36 AMR at 1449 EST on May 8. The flight was prematurely terminated as a result of a failure of the upper stage which ultimately led to complete destruction of the vehicle.

Operation of all systems appeared normal until approximately 44 seconds when 6 temperature measurements on the Quadrant I-II insulation panel simultaneously indicated an open circuit. This condition can result if a disconnect plug between the Quadrant I-II weather shield and the Centaur airframe were separated. At 49.7 seconds, shocks were noted on the axial accelerometer and the rate gyros. Between 49.8 and 49.9 seconds film data indicated that the Quadrant I-II weather shield was either completely or partially missing. From 54.07 to 54.11 seconds increasing amounts of vapor were visible around the Centaur vehicle. At 54.09 seconds all data from Centaur subsystems 1, 2, 3 and 4 was lost. All available data indicated that the Atlas booster systems were operating normally at this time. At 54.58 seconds, film data indicates an explosion and this was followed by loss of Atlas tank pressure, Atlas propulsion system shutdown and complete vehicle destruction.

A preliminary review of all available data has failed to reveal a reason for either loss of the weather shield or loss of Centaur structural integrity. ✓

b. Sycamore Test Stand S-1: An Atlas exploded on the GD/A S-1 test stand at 3:30 PM Sunday, May 13. The Sycamore S-1 test stand is adjacent to, and utilizes the same block-house as the S-4 stand used for Centaur. Severe damage was sustained by the S-1 stand. Further, the S-4 stand received damages which will result in at least two weeks delay in the testing of Centaur F-2. In addition, the explosion and damage to S-1 will probably delay the transfer of that facility to the NASA programs now scheduled for end of this year. ✓

c. Centaur Investigation: Congressman Karth has announced that his sub-committee will conduct an investigation into the Centaur program. Hearing will commence this week. ✓

NASA Hq (Dr. Seamans) has established a group to investigate the F-1 launch. This group will be chaired by Mr. Bill Flemming and is to have a report prepared for Seamans by the end of the week. The group will be at AMR on Monday and we will appear before the group in Washington on Tuesday. ✓

2. AGENA:

a. Mariner R: Agena-B vehicle 6901 was shipped from Lockheed Missile & Space Company (LMSC) and arrived at AMR May 9. The Atlas booster serial 145D is scheduled and expected to arrive on June 1. Mariner R-1 spacecraft will be shipped from Jet Propulsion Laboratory (JPL) on May 29. The second Mariner R space vehicle flight hardware is scheduled to arrive at AMR on the following dates: Mariner R-2 spacecraft - May 30; Atlas booster 179D - Jun 20; Agena-B vehicle 6902 - Jun 21. Present booster performance will allow a period of 52 days in which to launch the two Mariner space vehicles. The launch azimuth sector to be used is 93° to 111°. ✓

b. Gemini: During a meeting at MSC on May 3, LMSC gave presentations on Multiple Restart and Secondary Propulsion Systems for Gemini. LMSC and Bell Aero-systems' engineers are preparing detailed statements of work for discussion at the May 24 meeting. Detailed discussions are being conducted to determine the actual hardware to be used in both the Gemini capsule and Agena Target Vehicle in the area of Command and Control equipment. ✓

c. Ranger: On May 16, LMSC will present the Ranger 4 performance evaluation at Sunnyvale. This presentation will cover the Atlas, Agena and Spacecraft performance up to injection of the Spacecraft into its final trajectory. At about forty seconds of flight the Pulse Beacon in the Atlas guidance failed on Ranger 3 flight. Excessive vibration and G-loading were suspected as being the cause of this failure. Ranger 4 was instrumented to determine the loadings experienced by the Pulse Beacon. The results have been received and evaluated and show that the vibration and G-loading are within the expected range and, therefore, should not have been the cause for failure. ✓

B5-1P

1. CONTRACTOR SELECTION - POST NOVA STUDY

The evaluation of the proposals for this study has been completed by a team of 8 people under my chairmanship. Five proposals were received: NAA, General Dynamics/Astronautics, Lockheed, STL, and Douglas. The preferred sequence is: (1) General Dynamics/Astronautics, (2) Douglas, (3) Lockheed, (4) NAA, (5) STL. We strongly recommend General Dynamics/Astronautics and Douglas. They are the best and the cheapest. Furthermore, these two companies have been unsuccessful in winning any of the other FPO contracts and we do want to keep contact with their preliminary design groups. Do you go along with our choice? *yes B*

2. LIGHT WEIGHT "APOLLO" DESIGN

Dr. Eggers will present his proposal for a light weight APOLLO capsule to Dr. Shea this week. I believe he has a good story and I expect that the C-5 direct mode will pick up momentum as a result of Dr. Eggers' presentation. We expect that our calculations will show an attractive performance margin for the entire mission profile. ✓

3. PRESENTATIONS AND/OR REPORTS FOR DR. SHEA

This office will prepare the following presentations for the June 15 deadline on the APOLLO mission:

a. NOVA direct mode.

b. SATURN C-5 direct mode.

c. Operations analysis - all modes including earth orbital operations and lunar orbital operations (relationships of probability of success, time, cost and performance margin).

d. Growth potential of all modes for lunar base buildup.

e. One-way C-5 lunar cargo supply carrier system.

f. Planetary mission requirements and the size of NOVA.

The last two have lower priority and will only round out the total picture. If we also consider Dr. Geissler's lunar orbital operations mode and Joe deFries' earth orbital operations mode, we will have some three-to-four hours of presentation. How do you want to go about reviewing this material? Would it not be useful to set a date for a review and dry run?

H.H.K. From all I hear Joe Shea is very eager to move this date up to first week in June. Please check that we won't be heard only after decision on mode has been made!
B 5/18

reminds for myself:

Let me talk to Shea first this deadline then lay on view of Geissler / Koelle

96m

BS/18

-SAT

quest
page
abus
summary
B

1. Boeing Contract: In Mid-March we requested a modification to the Boeing contract to provide us with fabrication services for our in-house S-1C program. This contract is still not available and is causing many delays in the hardware development area. It seems to us that two months is an excessive time period at MSFC in order to modify an existing contract. ✓

Harry Gorman
Note
Gm 9-15

2. Vehicle Assembly Working Group: On May 3-4 a working group meeting was held with Douglas Aircraft on the subject of bonding. A discussion was held on the newest bonding problem encountered on the All Systems Vehicle common bulkhead. The problem is one of "unbond" at the outer edge of honeycomb near the attach angles. The major problem in making a "fix" was in the determination of the area of unbond. DAC had previously relied on a tap test for the hemispherical shape of the bulkhead. The process of ultrasonic testing in order to determine the extent of unbond had been unsuccessful on previous attempts. A suggestion was made by this Division's representative of the Vehicle Assembly Working Group to try a through transmission ultrasonic technique. This was performed on the unbonded head for the All Systems Vehicle on May 7 with successful results, enabling DAC to define the unbonded area. Certainly the use of this process in connection with repair techniques is of immediate value to the S-IV program. ✓

Bravo!
B

1. C-I

* SA-3: The short duration firing is currently planned for 5-18-62, and the full duration firing for 5-25-62. Transfer to M-ME would be effected on 6-5-62. A schedule has been established that will meet the committed launch date. ✓

Lange, SA-4: Assembly is progressing satisfactorily. The stage will be transferred to M-QUAL 2 weeks ahead of schedule on 5-28-62. ✓

lean SA-5: Start of assembly may be 2 to 4 weeks late but it is anticipated that this delay will be picked up during the assembly period. ✓

th critical S-IV: The battleship cold flow testing has been replanned for one week's activity and should begin 5-21-61. Hot firing is scheduled to begin the week of 5-28-62. The date is contingent upon delivery of vendor and DAC/Santa Monica items by promised date, and satisfactory vehicle/facility shake-down during the week of cold flow tests. ✓

in A new procedure is being instituted that should eliminate this problem on subsequent bulkheads. As a result, the all systems vehicle slipped about one week, however, the SA-5 vehicle is presently not affected. ✓

2. C-5

th # S-IC: The first review of the consolidated MSFC/Boeing Development Plan is scheduled for 5-17-62. ✓

2.g. Comments on the Boeing Plant Activation and Flow Plan and Procurement Plan have been prepared and were transmitted to Michoud Operations. Efforts are continuing on comments for the remaining plans. ✓

* S-II: Review of criteria on all proposed S-II facilities is continuing. At this time it appears that present facilities schedule can be met if construction funds are received by 6-1-62. ✓

S&ID firm cost proposal is expected 5-21-62 (about 2 weeks delayed). Reason for delay is that more time is needed to thoroughly review the costs and to document detail justifications for increase with respect to original proposal. ✓

SSO met with S&ID 5-10-62 to discuss the S-II engineering move to Autonetics Bldg. 2. Although there is some disadvantage inherent in the move because S&ID engineering personnel will be 15 minutes away from their program management, the change is not a serious impediment to the S-II program. The contractor is utilizing available facilities to best advantage considering the concurrent development of two major NASA projects. ✓

S-IVB: Douglas presented additional S-IVB program plans and cost data on 5-10-62. Data show no significant difference in cost between the 220 and 260 inch diameter stages, and no difference in delivery dates of the flight stages. The data indicate total program cost amount to approximately \$160 M plus fee for six flight stages (4 1/2 hour count capability with automated GSE). ✓

The technical evaluation of the original proposal by MSFC is under way. ✓

Best dates, as far as I'm concerned:

7 June, 15 June, 18 June, 19 June

Request suggestion. B

O.L. think we should hold an S-IC review meeting some time during first weeks in June. P&VE Test, Mide, ME should present their progress, M-SAT coordinating review. Participation of Boeing at least 1 time, possibly full time. They should report about their actions.

1. NEW PERSONNEL, CENTRAL PLANNING OFFICE - We have selected Mr. Ray Kline as Chief of the Managerial Data Center. He has been working in Management Analysis Division at AOMC, and will report Monday, May 21. ✓
 2. ORBITAL OPERATIONS - Mr. deFries has been requested by Dr. Shea's office to be in OMSF, 1:00 p.m. Tuesday for personal discussions on Lunar Orbital Rendezvous. We are also compiling and publishing an Earth Orbital Rendezvous Mode Book; which Mr. deFries will take to Washington. ✓
 3. SCHEDULING ACTIVITIES - We expect to receive by May 15 the first call for scheduling and funding data for the manned lunar landing mode. Informal information from headquarters is that this will be for Lunar Orbital Rendezvous Mode only. We are presently drafting a procedure for the detailed implementation of the uniform scheduling requirement both with Headquarters and within MSFC. ✓
 4. LONG RANGE PLAN - Mr. Abe Hyatt is expected to visit MSFC on May 17 and 18. We will discuss the latest issue of NASA's Long Range Plan. Hermann Koelle has been informed of the visit. ✓ *Don't quite see how we can discuss this matter intelligently before "mode" has been chosen B*
 5. MSFC WORKLOAD PLANNING - An MSFC workload planning study is being initiated based on projected program anticipation. This study is directed toward determining the level at which manpower becomes available for additional in-house projects. ✓
 6. PACIFIC LAUNCH OPERATIONS OFFICE ORGANIZATION - A letter is being prepared, for your signature, incorporating our comments to the OSS proposal on PLOO organization. ✓
- Jan*

Mac:

Please —

read Palazzo letter dated May 14.
Discuss with Massey, Kuehner,
Mrazek, Weidner, Gissler, Lange
and prepare

- either a meeting (with clear agenda points) where controversial questions can be settled
- or clarify all controversial points with the above people yourself and prepare the necessary memorandum for my signature or approval.

B 5-18

Mac[↑]

NOTES MRAZEK 5-14-62

B5/18

1. BOEING PERSONNEL: Total number of Boeing personnel aboard as of 5-9-62: 261. ✓

* 2. RIFT: All NASA people concerned with RIFT contract have reached agreement on type and term of contract to be negotiated with selected RIFT contractor. A CPFF (thru flight test evaluation) with Phase I negotiations thru December 1962, was agreed upon. The end of Phase I matches the NERVA Project milestone of verification of core selection, and commitment of major hardware. ✓

3. RIFT: The Bechtel contract, for NRDS-RIFT studies, is being extended from 6-2-62 until about 7-20-62 in order to insure continuity of effort until FY 63 funds can be applied. ✓

4. MANNED SPACE STATION: Advanced Structural Development Section has started a "Preliminary Project Development Plan for a Manned Space Station" with the first structural design conclusions due in M-FPO early in June. *When can we have a preliminary review on this?* ✓

* 5. TV CAMERA INSTALLATION IN SA-5: An investigation has been started of the environment of the general areas in which TV cameras could be installed. Proposed are: one camera in the spider beam area viewing one of the large fins; one camera in the engine compartment viewing suction lines, heat exchanger, gas generator, and engine movement; and one camera above the heat shield viewing thru a transparent plate in the heat shield. It will take in gas burning in the tail section below the heat shield, the air scoops, and will establish the effectiveness of the air scoops. ✓

6. SA-5: The first three 20 ft³ high pressure steel pneumatic spheres, manufactured by A. O. Smith, burst during ambient temperature pressure cycling. Examination of the burst spheres showed two possible material causes: (a) hydrogen embrittlement and (b) possible crazing of material due to extremely high tensile heat treat. These conditions were corrected for the fourth specimen; as of now this fourth specimen has completed 1500 of 2500 pressure cycles without evidence of failure. *I hope we'll test more than one before*

7. CENTAUR: NASA Headquarters (Mr. A. O. Tischler) called for Messrs. Torrel and Mulready of P&WA to be in Washington on 5-11-62 for a preliminary meeting prior to a Congressional Committee investigation on the CENTAUR explosion. ✓ *Committing ourselves to these spheres!*

8. S-IVB: Continued study of C-5 applications to EOR and LOR modes indicates that present S-IV propulsion system, consisting of 6 Pratt & Whitney RL 10/A-3(S) engines, is capable of the direct escape mission as in LOR mode, with performance equal or better than S-IVB. Engine-out capability appears attainable in C-5 direct escape mission. Someone at MSC or Headquarters will eventually discover this possibility - we will be prepared. *but more propellant load?*

9. SYSTEM INTEGRATION ACTIVITIES: (See attachment).

Mr. Mrazek:

This is too much detail for these NOTES

Mac I must disagree. This attachment (long as it is) is full of accusations + requires immediate attention.

Urgent

W.M.

request briefing with insler + SAT Kuelle present

B5/18

Memorandum

B5/18

TO Mr. Mrazek, M-P&VE-DIR

DATE May 14, 1962

FROM Chief, Vehicle Systems Integration
Office, M-P&VE-V

M-P&VE-V - 20

SUBJECT Systems Integration Activities

① Have Mac read it.
② Call meeting w/
Mac/Mrazek/Lange/
Palaoro/Weidner/Kuethner

1. General Information

a. A C-5 Design Criteria Book is being generated now and is about 50% completed.

c. A preliminary copy of the S-IC development plan for our Division has been transmitted to Saturn Systems Office as a part of our common effort with Boeing.

2. Now that I have installed Mr. Lawson as Centaur Project Engineer, we are getting into quite some activities. The Working Groups we have to cover meet about 2 or 3 times a month and mostly in San Diego. We have suggested to have more up here in Huntsville. There have been some classes conducted at Convair for Astrionics Division personnel and we have requested to have one in the near future for our personnel to generate a little more direct interest and knowledge in the Centaur. If we really dig into some of their problems, our 20 allotted spaces may not be enough.

3. I am still not very clear on our settlement with Launch Operations Directorate. I understand, the vehicle related GSE remains with Marshall Space Flight Center and most of it, at that, with Propulsion and Vehicle Engineering Division. But, I also understand we will only get 3 civil service people with this work and some contractors. I may have a wrong understanding of what this vehicle related GSE means, but I am pretty sure, there is more to it than these few people indicate. I talked to Mr. Fichtner on this, and his understanding is pretty much along the lines as I see it. The split should be straight forward between Facilities (Launch Operations Center), and Equipment needed for loading, checking and firing the vehicle. The storage tanks and pumps, nitrogen supply, etc., are facilities, but when it gets to the launcher, the cable masts, loading arms, hold down or release mechanisms, loading computers, pressure check-out equipment, disconnects, etc., everything that is vehicle related equipment on the launcher and/or umbilical tower, everything that Dr. Gruene's crew will need, electrical or mechanical, to check-out and launch the vehicle, except facility, should remain under Marshall Space Flight Center responsibility including the deflector.

Our latest (5-17) meeting with Dr. Debus should facilitate this issue somewhat.

Mr. Mrazek
asked me to look into this, to straighten out everything - I am not satisfied and let him know that transpires.

I thought these things had been taken care of by now or disentanglement committee 421 - B5/18

May 14, 1962

This stuff doesn't necessarily have to be in Propulsion and Vehicle Engineering Division, but it surely should be in the Center, that needs it to prepare and launch. Also the right people with the proper experience must stay with the work.

4. We have a problem already in the Launch Operations Directorate area between Marshall Space Flight Center and Manned Spacecraft Center. This may not be such a good example, but the thing can also happen in reverse.

5. Since several weeks, Launch Operations Directorate tries to establish the criteria for the complex 39 umbilical tower. We have brought representatives from all our stage contractors here for several weeks, to work with Launch Operations Directorate on the requirements.

6. In our last Apollo Mechanical Design Integration Meeting, we discussed these requirements with the Apollo-North American Aviation people. Their requirements are at first glance not compatible with our concept. Our people are very dogmatic in stating our philosophy, which I am sure, cannot be followed to the letter for the Space Craft.

7. This is not an unsurmountable problem if the two organizations will sit down and discuss the problem open minded. Right now it looks like we got 2 mules hitched up at opposing ends of the cart and they aren't going anywhere. I suggested to the Manned Spacecraft Center people to permit North American Aviation to send representatives here to participate. Well, after about a month and several phone calls and appeals, we still have nobody here to my knowledge. I am going to Houston on today to talk to our mechanical systems counterparts, who seem to be willing, if the pressure is put on.

8. We had a C-5 systems meeting in the Vehicle Mechanical Design Integration Working Group on the Ordnance Tower. Here also, Manned Spacecraft Center didn't want to let North American Aviation participate, because they felt North American Aviation had no information. Only after calling MSC (Mr. C. Johnson) and bluntly accusing him of refusing to cooperate did he agree to send people. Maybe the whole thing is still just lack of good communication. We sure don't aim to hold back any information from our side.

9. C-5

a. On the S-IC stage, we are making progress in establishing schedules and data toward this combined development approach with Boeing. It came up in discussions with the Boeing representatives again, that we have divided up the hardware problem areas pretty well for this task, but, who is pulling it all together and tries to make a compatible systems document out of it.

Please take up with Palao direct, and send me your (constructive) comments.

B5/18

Urgent
Dr. Kuetting
What's all this
We formed
the MSFC/MSD
Launch Operations
Panel to tackle
these problems.
Even if they
gettin anyone
as Mr. Palao
just not
informed?
Isn't he
and shouldn't
he be
a member
of that panel?

May 14, 1962

*You are
it! B*
W. Mraz
Oswald
Laure
b. I told the Boeing people that we in my office, Mr. J. Glover, will do this even if Marshall Space Flight Center will never get around to establish a Systems Integration Office officially. Maybe we will become the place by default. Our contractors need to have a place, where they can get guidelines and directions or help in the technical areas which go across and between organization lines, especially in areas which can only be understood by old Marshall Space Flight Center personnel, like actuator vs. hydraulic system, base heating vs. heat-protection, Instrument Unit, GSE, check-out, etc.. I thought this is what our office was originally supposed to do, coordinate, guide and implement or direct these integration problems. It can work effectively, if we will be officially established as such.

*Please
see me
on this
in a
joint
plan.
didn't
want
things were
so
confused!
B
5/18*
10. The prime responsibility for base heating, base protection, is still not cleared up. I am now attempting to get a memo from Aeroballistics Division to spell out, in detail, what they think they are responsible for.

11. The expression "Base Heating" has degenerated into a nebulous, catch-all expression whose interpretation and definition depends on the background and interest of the individual discussing the base problem. Base heating entails essentially the following 4 aspects:

a. Base flow dynamics (gas pressures, temperatures, velocities, mixtures, recirculation, etc.) is primarily dependant on altitude pressure and only secondarily influenced by free-stream velocity.

b. Thermal engineering/heating modes, jet radiation characteristics, incident radiation, thermal input to and distribution in materials, etc..

c. Materials engineering (optimized insulation schemes- ablation, re-radiation, sublimation, etc., instantaneous and total heat rates to materials, adhesion, combined structural-thermal-insulation concepts, etc..)

d. Structural design.

12. The combined effort in the above technologies is of consequence only when it is directed toward a design of thermal protection of structures, engines, components and equipment.

Agent
13. The base flow phenomena (temperatures, pressures, etc.) can be investigated thoroughly without knowledge of the thermal and material engineering. However, for vehicle design there exists the inevitable interdependence of thermal, material and structural engineering.

May 14, 1962

14. For the most effective and reliable vehicle design, the thermal, material, and structural aspects of base heating must be the design responsibility of the Propulsion and Vehicle Engineering Division.

15. These primary responsibilities must be reiterated and enforced in Marshall Space Flight Center. There will always be some overlap in the technical work and this is even healthy, within reason.

16. When it comes to publishing reports or making official statements, such things must be issued from the prime responsible source only, or at least coordinated with, prior to release. We not only undermine our own moral in these areas, but outsiders must wonder what is going on. In the stages, for example, the contractors probably get directions from 2 different groups as it stands now.

17. S-II Stage

a. The LH₂ suction lines will have to be redesigned. Present insulation of foam will only work if we have 10 sec. bleed of J-2 engine. We request to change to vacuum insulated lines. ✓

b. The stage dry weight has gone up by approximately 5000 lbs. Many items contributed increased propellant loading, heat shield, instrumentation, catwalks, structure, pressurization. We are supposed to have a permanent representative at Space and Information Division by about July 1, 1962. Under the present space situation, I don't think we can do this. We are still 2 people short in our office to replace transfers. I have the people lined up, but no spaces are left in the Division.

18. S-IVB

Meetings have been held with Douglas Aircraft Company to determine space requirements for the Instrumentation Slice. S-IVB and Guidance Instrumentation will interlace in the same area. ✓

19. The scope of work as presently prepared for Instrumentation Slice doesn't seem acceptable to me. It should not be called an Astrionics Slice, we don't call the other stages Propulsion and Vehicle Engineering Stages. The Slice is not an exclusive Astrionics Division piece of equipment and should be handled as a normal stage under Saturn Systems Office contract. The engineering of the Instrument Slice is a joint Astrionics and Propulsion and Vehicle Engineering undertaking. Astrionics is responsible for most of the equipment and its functional requirements (all electronics and instrumentation),

Agree
B
Astr:
has never
asked for more
than an Astrionics "black box"
procurement and installation contractor. This talk just
reflects a vast misunderstanding
on Palumbo's part. B

May 14, 1962

It isn't quite that simple, because C-5 aspects. We'll have a hearing on this. B

Propulsion and Vehicle Engineering Division is responsible for the overall arrangement, access and service provisions, temperature conditioning, mounting panels and brackets, cable installation and the structure. Propulsion and Vehicle Engineering Division also is jointly responsible with Astrionics for the environmental testing of subassemblies and the whole Slice. Preferably, the S-I stage contractor should be also the Slice contractor. Check-out equipment, automation, GSE required for the Slice is also required for the first stage and later since the S-I stage contractors will also become the vehicle systems contractor, he for sure needs all the equipment. This calls for much duplication, expense and dual training.

20. C-1

a. Apollo - The Q-ball will fly on SA-5 and SA-6, hopefully only as a measuring instrument and the accelerometers will control the vehicle. ✓

b. S-I Stage - The various added missions for SA-3 were already presented to the Board. No final settlement on all of them has been reached except the High Water Experiment. ✓

c. For SA-4, we are looking once more seriously into a Hydrogen Experiment or at least some testing towards SA-5. We would like to attach a hydrogen stack on the S-IV dummy stage at least to the S-I interface, a 45° faring and cut a couple of the S-IV interstage vent holes out and test the fabric covers. This requires a lot of work and instrumentation. If we have another successful firing with SA-3, which I am sure we will have, we must ask ourselves, what can we do on SA-4 that is different and will advance at least some of our knowledge and confidence towards SA-5. Unfortunately, with the tight schedule, we can't do too much, but we should at least try. *Agree, even if SA-4 slips a bit.*

d. S-IV - As you know by now, we had another accident with the common bulkhead. This time on the new one for the All-Systems Vehicle. Again, an area (approximately 3 ft. long) is debonded. It looks like another tooling problem. The bulkhead edges were clamped down during bonding and after curing, the clamps were released. The spring forces of the bulkhead were enough to crack the adhesive. ✓ *Just as long as SA-5 is delayed*

e. Douglas Aircraft Company will repair this bulkhead with injecting Lefkowitz and ultrasonically inspect. We will also try to work out a procedure to check after cryogenic loading tests in the All Systems Vehicle. ✓

SUBJECT: Systems Integration Activities

May 14, 1962

f. The whole thing appears to boil down to either missing or sloppy procedures or sloppy manufacturing and quality control. We transmitted this message to Hal Thomas and Ted Gordon in blunt words. They have promised to really buckle down. I am going to visit Douglas Aircraft Company this week to check into the problems and have a serious talk with Ted Smith. ✓

21. I will also attempt to get a closer coordination established between Space and Information Division and Douglas Aircraft Company on these problems. After all, the S-IV is still a small vehicle and our problems in the S-II will be bigger. ✓

22. Dr. Lucas is pretty much concerned about the matter of fact statements by Space and Information Division in the materials area and adhesives. They don't seem to think much of a problem exists.

He should point out his
concern in writing,
and ask them to
comment in writing!
We are here to
protect them and the project.
Maybe we should insist on
some demonstration samples
and test results with same

H. R. Palaoro
H. R. Palaoro

B

B5/18

1. Scheduling

Douglas Lord, Shea's Assistant Director for Mission Planning called on me for assistance in scheduling area. I sent my two experts, Sneed and Payne, to Washington to assist Lord today in comparison of EOR and LOR. ✓

2. Environmental Conditions and Safety Factors

Mr. O'Neill (Assistant Director for Design Standards and Reliability) of Shea's office was here again last Friday (11 May) to call on the support of my office. About 75% of my people give him support in that area. I talked to Jewel Moody of your Reliability Office for his inputs. Moody and my people sure know a lot more about Reliability and how to establish a plan or program than the Washington people do. I hope we can make our practical approach stick. ✓

Jan

* 1. SUPPORTING RESEARCH: Obligations (signed contracts) under the FY-1962 LVT Program now total \$4,707,366. The total FY-1962 funding authorized is 8.115M, not including Mr. Koelle's requirements. Many of the contract actions which are presently in P&C have been negotiated and are approaching the point of contract signature. ✓

2. RESEARCH INSTITUTE: We have reviewed the preliminary draft of the proposal from the University of Alabama for the Research Institute grant with Dr. Rudolf Hermann and Mr. Ken Thompson of the Institute. The final proposal should be on its way to Headquarters by May 18, 1962. ✓

3. OFFICE OF APPLICATIONS: Headquarters has requested MSFC to prepare several display boards which describe items developed by MSFC which have industrial potential. Mr. Thompson is taking action on this request. ✓

The presentation by Midwest Research Institute on Industrial Applications, originally scheduled for May 15 in St. Louis, Missouri, has been delayed. Senator Symington was to have made a presentation on this program and will still make his talk when the meeting is rescheduled. ✓

4. PROJECT HIGH WATER: Dr. Johnson is continuing to review the data from the SA-2 water release experiment. Data taken by some of the Air Force observers have not yet been received. Because of the possibility of lightning-type electrical discharges during expansion of the cloud, field strength records from receivers which were operating during the SA-2 flight are being studied by RPD. The relative amplitudes and times of the noise signals are being analyzed to determine if they may have resulted from the burst. ✓

Dr. Biondi of the University of Pittsburgh, who has been working with MSFC in planning the experiment, visited MSFC on May 10 and 11. In a talk at the University Center on May 10 he expressed the feeling of many upper atmosphere scientists by saying: "The release of 50 to 100 tons of matter by the SATURN places into the hands of scientists a powerful tool to probe the upper atmosphere". Dr. Johnson will make a presentation of "High Water" to the Space Science Board on May 14. ✓

5. MADKIN MOUNTAIN ANTENNA: Mr. Thompson has maintained contact with Mr. Hoberg, and with Mr. Todd of the Army, in connection with MSFC's interest in the antenna on Madkin Mountain. Mr. Todd was in Washington on May 10 and 11 for a meeting with Department of Army officials on this matter and has not yet returned to work. ✓

B 5/18

*
Jan

1. M-1 ENGINE PROGRAM: Letter contracts have been awarded to Aerojet General Corporation for R&D, Special Test Equipment, and Facilities for the M-1 engine program. Numerous discussions between Aerojet and MSFC during the past three to four months as well as considerable in-house effort of both of these organizations have resulted in the formulation of a Development Plan and a Model Specification which are generally satisfactory to both parties. The development plan includes a facilities plan which has grown out of joint efforts of qualified MSFC and Aerojet individuals, and which is consistent with a sound program. The result of these actions is that minimum effort should be required for definitization of the program, since most of the "spade-work" has already been completed, and both parties are aware of the desires and capabilities of the other. ✓

2. F-1 ENGINE PROGRAM: On 5-9-62 engine Number 005 successfully completed 76.1 seconds of a scheduled 76 second run at 1370K thrust level. A full duration (150 seconds) run at 1400K thrust level is scheduled for the first of the next week. This run was on test stand 1B-2 and a "first-look" at the flame deflector indicates that the thrust level and duration had no adverse effects on the deflector. MSFC still has reservations relative to the flame deflector surviving the effects of a full duration, full thrust and full gimbaling test. However, this test is somewhat encouraging. ✓

3. J-2 ENGINE PROGRAM: Release of J-2 C of F funds has been pending for several weeks and is currently delaying construction of Test Stands Delta-2 and CTL-III. The procurement plan for ordering deliverable J-2 engines has been forwarded to NASA Headquarters for approval. ✓

4. RL10 ENGINE PROGRAM: The first engine with a Connecticut thrust chamber has operated successfully for 2471 seconds (18 firings). ✓

May 21, 1962

B5-21

1. RENOVATIONS AT MICHLOUDa. General:

Initial renovations to the office and engineering buildings at the Michoud plant are approximately 96% complete. This effort is scheduled for completion by June 1, 1962. ✓

b. Office Building:

(1) Renovation work - completed.

(2) Air conditioning system - 90% complete. Check-out and balancing will start on or about ~~May~~ ^{MAY} 28, 1962. ✓

c. Engineering Building:

Scheduled for completion by June 1, 1962. ✓

d. Cooling Tower:

Repairs to Cooling Tower (Manufacturing Building) in progress. Approximately 85% complete. ✓

* 2. BOEING HIGH BAY AREA AT MICHLOUD

On May 16, 1962, Manufacturing Engineering Division, Michoud Operations and The Boeing Company agreed on the proposed high bay configuration. ✓

3. UNION AGREEMENT

The Mason Rust Company, Support Services Contractor at Michoud, reached an agreement with the New Orleans Metal Trades Council on May 16, 1962. The union agreement contains provisions for wages, hours of work, and other general working conditions. The basic craft rate of \$3.05 was established with lower base rates for employees less skilled. ✓

4. VISITOR

Mr. Arthur E. Raymond, formerly a Vice President of the Douglas Aircraft Company and now with the Rand Corporation and assigned as a consultant to the NASA Administrator, is planning to visit Michoud on May 22 and 23. The purpose of Mr. Raymond's visit is to acquaint himself with the Michoud facility, the FAA Building in Slidell, and the Mississippi Test Facility. ✓

* 5. SUPPORT SERVICES CONTRACTOR AT MICHLOUD

The Mason-Rust cost estimate for the follow-on contract was received in the amount of \$10,160,149 for period July 1, 1962 through June 30, 1963. This proposal is now being evaluated. ✓

1. Organization: As a result of our meeting on the LOC organization last Thursday, I contacted Holmes and briefed him. Wednesday or Thursday of this week we will present the first draft to Jack Young in Washington. ✓

2. Wind Tunnel Tests on Launcher/Transporter: Messrs. Poppel, Buchanan and Duren visited David Taylor Model Basin on May 10, regarding barge propulsion and stability tests of the 1/10 scale model C-5 Launcher/Transporter, and to discuss results of the wind tunnel tests of the 1/60 scale model umbilical tower and C-5 vehicle. Preliminary results of the wind tunnel tests are being analyzed by LOD. No written data have been received on the propulsion and stability tests; "flash" reports on this data are expected this week. Will forward them to you. ✓

3. GE Integration Contract: Discussions were held with a group of GE representatives on May 15. GE was indoctrinated in LOD operating plans and philosophy, and interface areas were discussed in some detail. Some headway was gained in getting across our position on appropriate and inappropriate areas for GE to concentrate on. A revised work statement received from Mr. Sloan subsequent to the meeting, limits GE's scope fairly well in agreement with our comments on the original proposed scope. In a later "in-house" meeting, a plan was developed to satisfy the GE requirements by proposing the assignment of GE personnel for specific tasks under direction of LOD personnel. This scheme has been discussed briefly with Mr. Sloan who was receptive to the idea. ✓

4. Boeing Task Assignment: Participation in the preparation of Boeing's work statement revealed that a memorandum of agreement between MSFC and Boeing contained the following statement, "...at a point to be determined by MSFC, Boeing will also assume operation of the complete C-5 system." I am taking steps to insure that such a statement is not to be construed as representing the launch operations area, where launch support will be contracted for in the initial phase and where an expanded role for Boeing will follow at a later date but not to include complete operational control. K.D. Panel B

5. An Atlas exploded on Sycamore stand S-1, May 13. Our F-2 vehicle was in stand S-4 nearby. Facility and vehicle checks are in progress to determine if any damages were suffered by F-2. F-2 vehicle will be removed from the stand and returned to the factory for a more detailed check to determine if structural damage occurred. The effect of this action on the Sycamore checkout schedule for F-2 is unknown at this time. ✓
There was some damage, I hear. B

6. Real Estate Acquisition: As of May 11, 1,327 tracts containing 14,351 acres have been acquired at a cost of \$17,423,039. Above figures include Declarations of Taking now being processed. ✓

7. Burttschell: As discussed with you, I am arranging a transfer of Burttschell from PMR to my staff at the Cape. My present plan will be to use him in a liaison function to Holmes for LOC actions which require expediting or coordinating. However, this plan will not be put into effect until later. K.D.

Don't remember!! Has Contrah agreed to this??
In the context of the MSFC-Boeing agreement, launch support for the STC-600ster only was considered Phased, for entire C-5 Phase 2. You'll always be involved overall. B

GD/A CENTAUR TEST FLIGHT F-1 EVALUATION: Messrs. Lindberg, Reed and Speer of Aeroballistics Division participated in a visit to GD/A on May 16/17, 1962, to discuss the evaluation status of the Centaur test flight F-1. The GD/A evaluation appears to proceed satisfactorily. Primary source of trouble was probably overpressure under the weather shield caused by an erroneous venting concept of the volume enclosed. After loss of weather shield the H₂ tank was somehow punctured. This initiated total vehicle destruction.

↓
E.G.
Are we passing this info on
Ar Newell and Cartright?
B

Jan

B5-21

1. VOTING LEAVE - In response to a request by officials of Huntsville and Madison County we are preparing a liberalized policy for excused absence for voting purposes in order to provide for voting absence throughout the day. This will alleviate crowded conditions at the polls late in the afternoon. Our proposed policy in this matter is being coordinated with AOMC. ✓
2. INTERSTATE 10 HIGHWAY BRIDGE - The Louisiana Highway Director concurred in the MSFC proposal for the interstate 10 highway bridge, but the Mississippi Highway Director objected. A meeting has been scheduled in Washington on May 21 to further discuss this problem with the Bureau of Public Roads. ✓
3. CHRYSLER - Chrysler was directed to proceed with plans for their own office building near Michoud. ✓
4. TEMPO II - A meeting was held to discuss operation of the Tempo II with Mr. Clapsaddle and Mr. Jones of Federal Aviation Agency. Mr. Clapsaddle is on a fact-finding mission regarding a possible violation of Section IX, Interstate Commerce Act, as it applies to air worthiness. Mr. Clapsaddle stated his report would be submitted to the FAA Regional Office in Atlanta on May 18 and that a decision should be forthcoming shortly. If the decision is against Mr. Kyle he could be subject to a maximum fine of \$1,000 for each flight he has made for MSFC (a total of 17 trips).

Harry,
I just don't understand this.
Request briefing
B
If I marked your NOTES,
I would have marked item 2
for Holmes TWX. Do you want
me to start marking them
or continue the present practice
of not marking them?
GMS-21

Harry S. ✓
Eberhard & I
must attend an
all day Management
Council Meeting at
MSFC that day, but
we'd like to make, too.
How can this be timed?

B5-21

B.5-21

1. CENTAUR: A violent explosion, on Monday May 16th, occurred during the testing of an Atlas F at Sycamore Canyon and caused the total loss of Test Stand S-1, which was planned for conversion to Centaur use. Centaur vehicle C-3 was mounted in nearby Test Stand S-4 and damage was estimated at \$30,000 with a minimum of two weeks delay in schedule. Vehicle C-3 has been returned to the factory for critical damage assessment and repair. ✓

2. CERTIFICATION OF SOLDERERS FOR APOLLO PROGRAM: Considerable interest in our certification program for solderers through the School for Reliable Electrical Connections has been demonstrated by several Apollo contractors. Collins Radio and MIT have submitted requests to this division for placement of their personnel in our school. ✓

3. AUTOMATIC VEHICLE CHECKOUT EQUIPMENT: The Vehicle Test Station and Digital Event Recorder were delivered from Packard Bell and barring unforeseen checkout difficulties will be utilized in the SA-3 Post-Static Test. ✓

B5-21

1. INCREASED COSTS RESULTING FROM EXCESSIVE PROCUREMENT APPROVAL LEAD TIME IN HQS:

The reorder of ST-124 platforms has been delayed several months (Procurement request was submitted by M-ASTR on 2/9/62; procurement plan was approved by M-ASTR on 3/21/62; it was not returned to MSFC until 5/14/62.) Negotiations are scheduled for the week of 5/21/62. The proposal from E-P (Bendix) states that our schedules cannot be met unless contract is let by 5/1. To meet a one month delayed schedule, .213M for overtime will be required. (With fees, etc., this figure will be about .250M.) At the same time Headquarters (Mr. Samuelson) is investigating the possibility of eliminating the ST-124 from the C-1 program and keeping the ST-90 because of FY-63 budget limitations. This is a typical example of additional costs caused by lack of prompt administrative approvals. *W.H. Please see me on this URGENT. B*

2. SATURN APOLLO SPACE VEHICLE ELECTRICAL SYSTEMS INTEGRATION PANEL:

Representatives from Fichtner's branch attended a meeting on 5/15 in Houston, Texas. Vehicle, payload, and GSE interface requirements were discussed and physical space requirements in the Transporter Launcher for the Apollo GSE. A cooperative spirit was evident during the discussion and progress was made toward establishing interface responsibilities. ✓

3. MSFC AUTOMATION PLAN: Plan, prepared by the Automation Board, has been published and distribution made to interested parties. ✓

4. CHRYSLER MANNING SCHEDULE - SI CONTRACT: Schedule running considerably behind. Of the 65 people authorized in Task Orders, only 52 are on board as of 5/18/62. At the present rate of expenditure as many as 5,500 hours of the 50,400 authorized may go unused. (This is a loss of approximately 28 man-months of supporting effort.) ✓

* 5. DISCUSSIONS ON GUIDANCE FOR GEMINI PROGRAM: Discussions were held recently between representatives of ASTR and MSC. A contract has been placed with Minneapolis-Honeywell, St. Petersburg Division for platform system. Basically this is the same as the Centaur system with certain changes. The majority of these changes are a redesign similar to the requirements established for ST-130. The guidance computer is being furnished by IBM who will have system integration responsibility. Computer memory will be similar to that to be used in our Advanced Computer and electronic packaging similar to ASC-15. ✓

W.H. That's that? Are they crazy? We need the 124 in the 5-5 program too! 22! Connection between 1 and 5? B

1. MARINE ACTIVITIES:

Barge PALAEMON shifted to position upstream of RSA coal docks to clear MSFC loading berth for PROMISE. PROMISE arrived at MSFC berth, 5/18/62. ✓

* 2. S-1-3 ACCEPTANCE FIRING:
gm

Short-duration (30 seconds) firing, 5/17/62, indicates satisfactory performance of the stage. Gearcase vibrations were all within nominal values. Full-duration (110 seconds) firing is scheduled for Thursday, 5/24/62. ✓

* 3. LOX BEARING PROBLEM:
gm

Latest word from Rocketdyne: They have not been able to duplicate these failures. This week should bring their electronic "listening" device to maturity. S-1-5 and S-1-6 engines will be analyzed by their technique. All future engines will also be treated in this fashion. ✓

4. REVIEW OF S-IV TEST STANDS AT DAC, SACRAMENTO:

A five-man review team from Test Division, MSFC, spent 5/17-5/18/62 at DAC-S-IV Test Site, Sacramento, California. The survey indicates several modifications necessary prior to cold flow and hot firings. A report of these findings will be sent to you later this week. The cold flow schedule is now tentatively slipping to 6/1/62. ✓

o.k.
B5. RL10 ENGINE TEST PROGRAM:

Installed RL10 engine, S/N 1728 (first hot firing model at MSFC), in stand and ran LN₂ cold flow on LOX side, 5/17/62. ✓

* 6. RIFT FACILITIES:
gm

The contract with Bechtel Corporation for "Conceptual Studies on the RIFT Facilities" was suspended last Friday, 5/18/62, due to over-expenditure of funds. A discussion with Bechtel will take place tomorrow.

K.H.

I understand you are not satisfied with Bechtel and propose to replace them altogether. Is that correct?

B

CONFIDENTIAL

NOTES 5-21-62 HUETER

Taken care
of
today.

B5-23

1. CENTAUR:

a. F-1: Evaluation is still in progress. Evans and I will attend the presentation of the Fleming Committee report to Headquarters on Monday, May 21. During same visit, we will receive Headquarters' direction for Centaur Program.

b. F-2: Due to the explosion at Sycamore S-1, preliminary evaluations indicate F-2 will slip a minimum of two months past the mid-October scheduled date. A study is being made to determine an alternative for schedule possibilities including the removal of F-2, and to repeat the structural flight without propulsion as primary objective.

H. Hueter Please see me with Mr. Evans for a 1 hr - 41 - 40 discussion on intensified inhouse support of Centaur project. Make appt. w/ Bonniel, B

2. AGENA:

a. Gemini: A meeting was held at McDonnell (MAC), St. Louis, to discuss Over-all Systems Checkout and Compatibility test program proposals of MAC and Lockheed Missiles and Space Company (LMSC). The Design Developmental test programs were also discussed.

Three types of Systems Checkout test programs were discussed in the meeting. LMSC presented a documented proposal, including estimated cost, and schedules for the 3rd type. The three types are: (1) Go-No-Go Testing; (2) Simulator type of testing mostly resulting in more qualitative measurements than quantitative; (3) Combined Over-all Systems Checkout complex test program with detailed quantitative measurements resulting.

LMSC stated that Type 3 Test Program would cost from 1.2 to 1.5 million dollars, and require a 12 to 17 month lead time on the test hardware ground station simulation requirements. Type 2 would cost between 0.5 and 0.75 million dollars. ✓

b. FY 1962 Agena Program Budget: The approved 1962 Program Operating Budget was \$84,072,000. All this amount with the exception of \$1,700,000 has been obligated. The purchase request for the \$1,700,000 is in M-P&C awaiting funds. The budget was obligated as follows:

Agena Vehicle	\$47,792,000
Atlas Booster	24,424,000
Thor Boosters	7,000,000
Misc Support	3,304,000
Backup Aerospace Ground Equipment	1,552,000
	<u>\$84,072,000</u>

\$2,000,000 has been received from MSC by sub-allotment effort on Gemini. This was used to initiate a contract with LMSC for studies and early design effort on Gemini. ✓

c. Ranger 4: Lockheed (LMSC) has a brief quick look report on vehicle performance on the Ranger 4 flight.

Atlas performance was well within specifications.

GE guidance performance was well within specifications.

Agena gave an excess velocity of 15 ft/sec to the spacecraft over normal. This was within the 1.6 sigma deviation.

The Agena missed the moon within expected tolerances.

Atlas vernier engine cutoff came from program backup rather than from the ground. The reason for this is not known at this time. ✓

CONFIDENTIAL

B5-4

1. NOVA

The interim briefing on the "NOVA-APOLLO" in-house study is scheduled for Friday, May 25* at 4:00 p.m. as per your request to Frank Williams.

The NOVA System Study Source Evaluation Board will be rescheduled for June 20* from 9:00 to 1:00, if it meets your approval. We feel we want to make a selection of a study contractor for a NOVA baseline study, regardless of which way the decision goes. Even if NOVA is dropped from the initial lunar mission, we need a point from which to depart in order to come up with a bigger and more efficient NOVA. It is logical to have one study along this line since it was originally proposed for this very purpose - to establish a basepoint. ✓

2. FUTURE PROJECTS OFFICE NAME

Mr. Neubert informed me that Mr. Dixon and Mr. Siepert proposed to change the name of our office. While we would prefer to keep it, because it says just what it should, we can offer the following alternate name: "Advanced Systems Office." *If they want it, I think we should follow suit.* o.k. with me

3. MANNED PLANETARY FLIGHT

Mr. Harry Ruppe has skillfully compiled the present status of knowledge for manned Mars flight. It is a presentation of slightly over one hour, which he would like to present to you. If you hear this (which is very good background for any NOVA decision), you will not have to worry about the planets for the rest of the year - you will have the essential facts important at this time.

Mr. Ruppe will be on leave from June 9 through July 15, 1962. He is ready to give you a presentation any time before or after. ✓

4. ENVIRONMENTAL FACILITIES AT MTF AND MSFC

Preparation of costs, justification, location and scheduling of the environmental test facility at MTF and MSFC has been turned over to the Central Planning Office. Mr. Preston Reed is the primary contact. Test Division is on board and is working with Sverdrup and Parcel (S&P) for siting of the facility at MTF. We are functioning as consultants to Mr. Reed involving history, justification and long range testing. Future inquiries should be directed to Mr. Reed, 876-2172. ✓

*These items are on your calendar.

Jan

1. Boeing Contract: The requirements for a manufacturing service contract with the Boeing Company has not been approved by Washington as of this date. Consequently, no processing action has been initiated by P&C. 11.2

2. Boeing Facility Plan: Plans for the high bay facility at Michoud have been finalized. The two level structure as proposed by the ME Division has been basically accepted. The total square foot area was reduced from 120,000 to 34,300 of which only 9,860 sq. ft. is 200 ft. high. ✓

*
jam 3. S-II Stage: A Manufacturing Engineering Report from NAA gives the following definition of soft and hard tooling: "(a) Soft Tooling - a tool to have no hold down fingers or restraining bars; material to be free to expand during welding; (b) Hard Tooling - tool to be massive and to have hold down fingers on restraining bars; material to be restrained during welding." These definitions have also been accepted by Boeing and MSFC. All three parties will use the soft tooling principle. This idea originated here at MSFC under the name of flexible tooling. ✓

B5-24

1. C-1

* SA-3: Short duration static test was accomplished on 5-17-62. Preliminary review indicates a satisfactory test especially in the engine area. Full duration static test tentatively scheduled for 5-24-62. Transfer to ME Div. is scheduled for 6-4 or 5-62. ✓

SA-4: Booster is in assembly shop. Tail area Phase III installation is about 60% complete. This is the last phase prior to transfer to Quality Div., which is expected on 5-28-62, two weeks ahead of schedule. ✓

SA-5: Start of assembly is being paced by the tail section. The tail section is currently in fixture number 2, estimated 2 to 4 weeks late.

Three 70" tanks from Chance Vought were sent back for minor rework. ME is in process of revising assembly schedule to accommodate this delay and tail section delay. It is anticipated that through use of overtime and double shifting (Chrysler support) booster completion will meet scheduled date. ✓

Additional Mission for SA-3 and/or SA-4: Concerned MSFC Divisions will make final solutions in a meeting on 5-21-62.

* S-IV: The battleship cold flow test is now scheduled for the week of May 28. The delay is caused by the late delivery of one GSE Panel. Hot firing is scheduled for approx. one week later. ✓

* The all systems common dome was scratched and dented near the dollar weld, when the top of the autoclave was being positioned over the bulkhead in the autoclave. The bulkhead has been rejected for use in the all systems vehicle. Impact on the schedule has not been determined yet. ✓

2. C-5

S-IC: The first report on MSFC/Boeing Development Program Plan was presented on 5-17-62. Based on comments from this presentation and inputs from the teams, a second draft review is scheduled for 5-24-62.

Consolidated MSFC comments on the Boeing Instrumentation, Tooling and Facility, and Reliability Plans will be transmitted to Michoud Operations by 5-24-62.

Boeing Company presented information to M-SAT on May 11, indicating a potential contract overrun on the S-IC Program. This office is initiating action to the Contracting Officer's Representative, recommending means of alleviating this adverse situation. ✓

S-II: Final NAA cost proposal is expected to be sent out on 5-21-62. ✓

S-IVB: Douglas was directed to use a 260 inch diameter in all further S-IVB effort, and to preserve all work accomplished utilizing the 220 inch diameter.

On 5-23-62 DAC will present to MSFC the result of their investigation of using Rocketdyne facilities for static testing.

On 5-24-62 the Ad Hoc Working Group will review and discuss comments on the S-IVB proposal, and program plans. ✓

Dr. von Braun's Comments to Notes, 5-7-62, Lange

1. NAA decision to move S-II engineering from Downey Plant to an Autonetics Building.

- "O.L. Let's keep a keen eye on the impact of this move!"
(Taken care of. See Notes 5-14-62, Lange)

2. Delay of approx. 3 months of S-II facility construction will occur.

- "O.L. Not acceptable! Request briefing at your earliest convenience.
UA item!! B."

(A TWX was sent to HQ's (Holmes) by Mr. Gorman on 5-18-62 requesting immediate action on release of FY-62 funds for S-II facilities construction.)

Dr. von Braun:

A copy of this TWX is available along with Lange's 3 page, single-spaced, explanation for need for TWX. I suggest you do NOT read it.

✓
B

JM 5-21

1. FIRST TECHNICAL PROGRAM COORDINATION MEETING - The first of a new series of Bi-Weekly Technical Program Coordination Meetings was held on May 16. All divisions (except M-RP) and all project offices of MSFC were represented. All elements of M-CP and M-FIN will participate with the divisions and offices in these meetings, which are designed to promote free interchange of information in the planning, programming, budgeting, scheduling, management data, and related areas. ✓
2. NASA AGENCY-WIDE MANAGEMENT CODING STRUCTURE - Regarding your inquiry, on 3(c) of the 5-7-62 Notes, attached. The difference of opinion between the engine and vehicle people arises from the proposed inclusion of Engine R&D under Propulsion Development rather than under the vehicle program for which the engine is being developed. M-SAT feels that this may deprive them of necessary controls over the development of the total vehicle, including engine. Engine Management Office, P&VE, insists that they must have the flexibility to manage all engine programs concurrently. We feel that this is justified and that overall managerial controls will insure efficient program management under this concept. ✓
3. SCHEDULING DIRECTIVE - Informal information from OMSF internal meeting on May 14 and 15 indicates that scheduling guidelines and assumptions (for submission of Lunar Program schedules) will be somewhat delayed. Apparently, OMSF proposed flight schedules will be included with the guidelines for Center comment. ✓
4. BUDGET SUMMARY is being prepared, reflecting in three sheets, a capsule summary of the current status of FY-62, FY-63, and FY-64 R&D Budgets. This document will be available in updated form for reference by MSFC top management. It is the first of a series of management summaries. To be included in the total package are status of facilities, schedules, budget (in several dimensions) etc. ✓
5. NASA LONG RANGE PLAN - Mr. Hyatt's visit last week was cancelled. We are continuing on the analysis of NASA Long Range Plan and comparison with MSFC planning. ✓

1 Enc:

Portion of Notes 5-7-62

96m

1. C-5: As a result of the P&VE Division C-5 Meeting held 5-2-62, the following Directive # 18 was released:

a. Propulsion and Mechanics Branch will expedite studies on C-5 Mechanical Automation and report in the C-5 Meeting in four weeks. (6-6-62) ✓

b. The machined "Y" Ring (Bulkhead Container Skin Intersection) approach will be adopted as recommended by the Structures Branch and The Boeing Company; however, two methods of manufacture will be pursued, one by electron beam welding, the other by fusion welding. ME Division will perform R&D in electronic beam welding and Boeing will perform R&D in fusion welding of the 5" thick 2219 Aluminum Alloy. ✓

c. Structures Branch will carry on parallel design of the cruciform and the ring-type baffle until 6-6-62. At this time, representatives of the Structures Branch and Aeroballistics Division will make recommendations from which a final design approach will be selected. (Preliminary weight comparisons indicate a weight savings of 6000⁺ pounds in the ring-type baffles versus the cruciform). ✓

d. The following design criteria will be used in studies and analysis pertaining to the C-5 Vehicle.

(1) An Isp of 424 for the J-2 Engine in a clustered status. ✓

(2) An Isp of 422 for the J-2 Engine in the S-IVB version. ✓

(3) A total mainstage, S-IC propellant weight of 4.4 million pounds including 30,000 pounds for propulsion performance dispersion. } why that difference B

(4) The thrust of F-1 Engine will increase by 75,000 pounds over and above that due to ambient pressure change. This is due to changes in pump inlet pressures under acceleration to be more effective than anticipated. ✓

2. MATERIALS PROBLEMS: (Ref: Item No. 4 Notes Mrazek 4-23-62; Attachment No. 1). See Summary of Failure Analysis (Attachment No. 2). ✓

3. BOEING PERSONNEL: As of 4-4-62 the total number of Boeing personnel on board was 228. ✓

Attachment No. 1: Notes Mrazek 4-23-62

Attachment No. 2: Summary of Failure Analysis

ATTACHMENT No. 1

21. Occurrence: Pratt & Whitney has requested permission to use a polyester resin impregnant as a common practice for all aluminum castings on the RL 10 engine. Status: We will test samples of the proposed impregnant for LOX impact sensitivity. Other mechanical tests will be made at MSFC and P&W to verify suitability of this procedure. Impregnation has generally been disapproved by MSFC. ✓
22. Occurrence: Feasibility study of coatings for titanium pressure spheres in LOX tank of S-IC resulting in approximately 2000 pounds weight saving. Status: Selected coatings applicable to titanium are under analysis to determine the effectiveness of such coatings to safely lower sensitivity of titanium to permit the recommendation to be incorporated. Solution expected but not available at this time. ✓
23. Occurrence: Failure of common bulkhead in S-IV during cold testing. Status: Analysis by DAC and MSFC has resulted in procedure changes during manufacturing. Problem remains unsolved at this time. ✓ ← *PeVE Please elaborate*
24. Occurrence: Review of DAC S-IV heat shield materials established certain inadequacies in development program. Status: MSFC has directed testing of all heat shield materials in combined environment of calculated thermal, mechanical, and vibrational environment. ✓ *B*
25. Occurrence: Failure of S-IV forward interstage skirt. Status: Under study at this time with no definite solution. ✓
26. Occurrence: Air Force proposal for siting of Titan III launch complex. Status: Extensive study of both explosive and corrosive/toxic environment hazards to which VLF 34, 37, and 39 will be exposed is underway. ✓
- 112 27. Occurrence: Excessive friction of Centaur gimbal bearings. Status: Calculations show that the friction in current gimbal bearings exceeds actuator capability under certain flight conditions. Investigation is underway to select a more satisfactory lubricant. *B*
28. Occurrence: LH₂ Properties Standardization. Status: Critical review of all values for the properties of LH₂ is underway on a highly urgent basis in order to provide all SATURN contractors with common data. This is being co-ordinated with industry, contractors, NBS, and NASA-Lewis. Thermodynamic data have just been recommended; transport properties are now being examined. ✓
29. Occurrence: Corrosive atmosphere associated with vehicle assembly at Michoud Ordnance Plant. Status: Intensive survey of precautions which must be incorporated into assembly procedures by contractors operating in Michoud. Complete solution is not available at this time. ✓

ENGINEERING MATERIALS BRANCH

May 18, 1962

Notes to Dr. von Braun

B 5-29

- Reference: 1. Item 4 of April 23, 1962 P&VE Notes
2. Summary of Failure Analysis and Very Urgent Flight Hardware Projects Under Study in Engineering Materials Branch(M-P&VE-M) During April 15 - May 1, 1962, Items 23 and 27.

Item 23

Occurrence: Failure of common bulkhead in S-IV

Status: Three failures have caused scrapping of the first two S-IV common bulkheads manufactured by Douglas Aircraft Corporation. First failure, due to overpressurization during leak test, caused large areas to debond. Bulkhead scrapped. Corrective action - reduce leak-check pressure which did not simulate flight conditions anyway. Second failure - debonding of honeycomb from bulkhead skins at edge. This is believed due to either (1) warpage present before bonding and subsequent excessive stress upon removal of clamps used during bond cure, or (2) wedges imprudently forced into crevice between bulkhead side flanges. Corrective actions - insure warp-free conditions and preclude forcing of wedges. Problem remaining at time of previous report was establishment of fix or scrapping of this second bulkhead. Establishment of fix was based on highly questionable adhesive patching. Since then, this same bulkhead was severely dented by inadvertent collision with an overhead beam. Such denting undoubtedly caused crushing of internal fiberglass honeycomb. Decision then made by MSFC and DAC to scrap this bulkhead also. (as of 5/17/62)

Initial review of DAC procedures for bonding and fabrication of bulkhead indicates considerable lack of detail in directions to workmen. Much tighter procedures and policing by responsible individuals to insure conformance appears mandatory if such mishaps are to be eliminated. Furthermore, while DAC plans to test the common bulkhead at cryogenic temperatures, and the effect of vibration, shock, or fatigue at room temperature, no plans are underway for investigating the effect of these mechanical forces at cryogenic temperatures. This investigation is believed to be necessary, and DAC has been requested to prepare a test plan for such a study, from laboratory specimen evaluation to scale model testing, if feasible.

Item 27

Occurrence: Excessive friction of Centaur gimbal bearing

Status: The Centaur design analysis of the gimbal bearing assumed the coefficient of friction would be constant at 0.1. Laboratory experiments have established that under the environmental pressure experienced by Centaur in flight, less than 5×10^{-8} mm of mercury, the coefficient of friction of the gimbal, using the lubricant specified, will be variable with a minimum value of 0.2 and a maximum value as

high as 0.6 to 0.7. Under these conditions, the actuator cannot meet the specified compliance of 8°/second. Mathematical analysis done at GD/A shows that a coefficient of friction in excess of 0.2 will result in non-compliance of the actuator at the third ignition. The extent and time of non-compliance for higher functional coefficients have not been established but are being studied. It is believed that a change in the dry film lubricant can be made which will solve this basic problem; however, P&W has procured and received the first 28 gimbal bearings. These have been manufactured by a subcontractor, and parts are not interchangeable. Furthermore, P&W claims that attempts to refurbish these gimbals will result in destruction, since each is manufactured individually in a custom-made manner. Therefore, assuming a suitable lubricant can be specified, incorporation of this lubricant, either cannot be effected until vehicle 26, (three gimbals are spares) or vehicle delays will occur while new gimbals are manufactured. The extent of these delays is unknown. If the currently available gimbal bearings are used, and if the coefficient of friction is only 0.2, an assumption which is not well founded experimentally, the actuator force available to move the gimbal at the specified compliance is 1370 ft-lbs. The actuator force required to move the gimbal at the specified compliance at the third ignition is 1368 ft-lbs.

W. R. Lucas

B 5/29

1. Reliability:

My office is still working heavily in this area and will continue to do so.

I agreed with Eberhard that your Reliability Office support us.

Together we should in time come up with a practical Reliability Program for QMSF.

2. Mission Plans and Schedules:

Two of my people went on call to Washington to assist Douglas Lord - Shea's Assistant Director for Mission Planning - in preparing optimistic plans and schedules for each of the lunar modes under consideration.

They participated as active members on an "Ad Hoc Group" established by Lord and chaired by Chuck Cole (with representatives from the offices of Lilly, Rosen and Low).

These optimistic plans and schedules will be sent to the Centers for comments.

After return of my people (Sneed and Payne) from Washington, we briefed Hans Maus last Wednesday, May 16, on above, and are keeping him posted.

3. Space Electronics and Telemetry Symposium:

The Advanced Program is to be readied for printing and you will be named as Banquet Speaker, but I will have a replacement speaker in case you have to cancel, even on short notice.

Jan

B5/29

1. HOUSING FOR RPD: RPD's move to Bldg. 4723 has been tentatively scheduled for October 1 by the Facilities Review Board. It will take that long for the Facilities Engineering Office to draw plans for modifications, let a contract, and have the modifications accomplished. There is nothing more that RPD can do at this time.

My memorandum of March 28 to you concurring in our move to Bldg. 4723 also contained a proposal that RPD be permitted to plan for a new building of our own. Mr. Neubert told Mr. Heller to go ahead with further planning. On that basis we have been in contact with Mr. Luehrsen; we looked at a possible site and he drew up a preliminary plan. Mr. Neubert now has the plan and is waiting to review it with you. I would appreciate hearing your reaction to the plan, and to find out if and when approval will be requested from Headquarters. Dr. Nees has principally approved of our plans for a Research Projects Division Building.

ACTION REQUIRED. By Neubert *gms-21*

2. CRYOGENICS IN SPACE: Mr. Heller and Mr. B. F. Jones of RPD were among 8 MSFC people who attended a symposium on storage problems of cryogenics in space held at Lewis Research Center on May 16 - 17, organized by OMSF. About 60 people attended from NASA Headquarters, NASA Centers (Marshall, Lewis, Goddard, MSC, Langley), and contractors of OMSF and Marshall (A. D. Little, Douglas, NAA, Boeing, General Dynamics, Aerojet, Martin, Cornell, Air Research, Beach, McGill University, Air Products), the Air Force (Edwards, Wright-Patterson), and National Bureau of Standards, Boulder, Colorado. Main topics were thermal problems and to a lesser degree, micrometeoroid protection. The information, presented mainly by A. D. Little, Lewis, and Douglas, was of excellent quality; however, the overall impression was that more work has to be done, particularly in the thermal design area and in the micrometeoroid protection area.

Most of the experiments made in both areas were on a very small scale. The obvious conclusion is that in addition to laboratory work and studies, experiments on a large scale (SATURN) are needed. The work of A. D. Little, Lewis and Douglas will be followed closely by Mr. B. F. Jones of RPD.

B5/29

1. M-1 ENGINE PROGRAM: A decision was made by MSFC, during the Design Concepts Review Board Meeting on 5-10-62 to direct the Aerojet General Corporation to design a thrust chamber nozzle contour for the M-1 with a 40:1 expansion area ratio to flow full at sea level conditions.

2. J-2 ENGINE PROGRAM: Release of J-2 C of F funds has been approved, according to verbal info received from FEO on 5-17-62.

Installation of the diffuser at VTS-2A has resulted in shut down of testing of engine systems and thrust chambers, until the installation is complete, which will be during the next report period.

Mr. Weidner, Please spell out.
Vertical Test Stand

* 2. F-1 ENGINE PROGRAM: Turbopump #015 successfully accomplished 132 seconds of a 150 second scheduled run with LOX and RP-1. Low supply of LOX in the gas generator propellant supply tank caused the premature termination. This pump will now be assembled into Engine #008.

An attempt for a full duration rated thrust test on Engine #005 terminated after 2.8 seconds of mainstage due to a turbine overspeed malfunction. No hardware damage.

* 4. RL-10 ENGINE PROGRAM: The pre-PFRT program (Engine FX145) is progressing satisfactorily. Thirteen firings have been completed.

The A-1 hot gimbal program at Lewis Research Center is approximately 50% complete. Engine operation has been satisfactory, and a significant amount of information has been accumulated. Upon completion of the hot gimbal program in June, the engine will be modified to facilitate the demonstration of engine throttling capabilities.

5. H-1 ENGINE PROGRAM: The \$950,000 for initiation of a follow-on buy of Engines for SATURN C-1 Operational Vehicles was received this week. These funds have been certified to M-P&C and it is expected that a letter contract will be executed on or about 6-1-62.

May 28, 1962

NOTES 5-28-62 GORMAN

B 5/29

* 1. INTERSTATE 10 HIGHWAY BRIDGE (See NOTES 5-21-62 attached)
In Washington, D. C. on May 21, 1962, a conference attended by Bureau of Public Roads, Corps of Engineers and NASA was held. NASA recommended a 65 foot high bascule bridge (without machinery). With this recommendation was an offer to pay the cost difference between the bascule bridge and the bridge originally planned. The Bureau of Public Roads desires to restudy the cost of a tunnel beneath the canal. For this reason a decision on the NASA proposal was held in abeyance. ✓

2. SAFETY - MSFC has worked 110 days without a disabling injury. The last disabling injury was February 2, 1962. This represents a total of approximately 3,291,750 manhours. ✓

3. VISIT TO WEST COAST CONTRACTORS - It might be worthwhile for you to set aside an hour or so to discuss the highlights of our trip to the West Coast. I think Eberhard would agree that it is a matter of priority to hire a top rated individual to head up the project office at Downey.

4. S-II FACILITIES - Lange will report on this subject. ✓

Yes, by
all means.
Suggest
31 May
after
Staff Luncheon,
B

gan

NOTES 5-21-62 GORMAN

1. VOTING LEAVE - In response to a request by officials of Huntsville and Madison County we are preparing a liberalized policy for excused absence for voting purposes in order to provide for voting absence throughout the day. This will alleviate crowded conditions at the polls late in the afternoon. Our proposed policy in this matter is being coordinated with AOMC.
2. INTERSTATE 10 HIGHWAY BRIDGE - The Louisiana Highway Director concurred in the MSFC proposal for the interstate 10 highway bridge, but the Mississippi Highway Director objected. A meeting has been scheduled in Washington on May 21 to further discuss this problem with the Bureau of Public Roads.
3. CHRYSLER - Chrysler was directed to proceed with plans for their own office building near Michoud.
4. TEMPO II - A meeting was held to discuss operation of the Tempo II with Mr. Clapsaddle and Mr. Jones of Federal Aviation Agency. Mr. Clapsaddle is on a fact-finding mission regarding a possible violation of Section IX, Interstate Commerce Act, as it applies to air worthiness. Mr. Clapsaddle stated his report would be submitted to the FAA Regional Office in Atlanta on May 18 and that a decision should be forthcoming shortly. If the decision is against Mr. Kyle he could be subject to a maximum fine of \$1,000 for each flight he has made for MSFC (a total of 17 trips).

1. RENOVATIONS AT MICHLOUD

a. General:

Initial renovations to the office and engineering buildings at the Michoud plant are approximately 98% complete. This effort is scheduled for completion by June 1, 1962. ✓

b. Office Building:

(1) Renovation work - completed.

(2) Check-out and balancing of air conditioning system will begin May 29, 1962. ✓

c. Engineering Building:

Scheduled for completion by June 1, 1962. ✓

d. Cooling Tower:

Repairs to Cooling Tower (Manufacturing Building) in progress. Approximately 90% complete. ✓

2. VISITORS

a. Dr. A. E. Raymond, Special Consultant to the NASA Administrator, visited Michoud Operations on May 22, 1962. The purpose of Dr. Raymond's visit was to acquaint himself with the Michoud Facility, the new FAA Building in Slidell, and the Mississippi Test Facility. ✓

b. Mr. Guillan, Mr. Aden, and Mr. Wible of MSFC will visit the Regional Office of the FAA in Fort Worth today. The purpose of this visit is to arrange "use agreement" between FAA, GSA, and MSFC for the FAA facility in Slidell, Louisiana. ✓

c. Mr. Wilson Hunter, Office of the NASA Administrator, visited the Michoud Facility for a general orientation. He also expressed an interest in the Mississippi Test Facility and planned to drive through the MTF area on his way to Huntsville. ✓

3. COMPUTER FACILITY

Mr. J. Salmanson, NASA Headquarters, telephonically requested information on May 24 and 25 relative to the status of the Computer Facility for Michoud Operations. His telephone calls were prompted by a letter directed to Dr. Seamans by RCA Univac which requested, in essence, that RCA Univac equipment be selected. Present status is that the Michoud Computer Steering Committee is evaluating the proposals that have been submitted and that a recommendation should be made by June 1, 1962. ✓

4. MASON-RUST CONTRACT

The Mason-Rust cost estimate for follow-on contract was reviewed and evaluated by Michoud during activity week. Comments and recommendations were submitted to Contracting Officer on May 25, 1962. It is expected that contract negotiations will begin between May 28 and June 1, 1962. ✓

5. CHRYSLER CONTRACT

The Chrysler proposal for follow-on contract was received on May 24, 1962 for evaluation. ✓

B5/20

1. LOC Organization: Clark discussed the interim organizational proposal with Young. It seems that Holmes had INFORMED Seamans of this possible solution, but formal approval will not be requested until details are presented. Plans are for: (1) Young to complete mission and function statements; (2) Forward copies of new proposal to MSFC, MSC and LOC for further comments; (3) I will contact you for discussion when received. COMMENT: It appears unlikely that it will be ready by July 1. ✓
2. House Bill: The inclusion of the land assignment to NASA in the House Bill has caused a flurry. Letters written between DOD and NASA indicate that action may be taken with the Senate to remove this statement. I talked to Webb Sunday and he seems to have a grasp of the idea on "why" we believe that retention of land is important to NASA. He indicated that he had not heard of the Ruebel letter which directed Davis to become the full manager. ✓
3. Additional Land: Indications are that DOD cannot support the additional land requirement for the Titan III Program. I understand further that NASA will have to justify it. This presents a problem of scheduling in that: We must site the C-5 in the near future (three to four months) and yet, the Titan III Program cannot be sited until we get a commitment on the new land. (Maybe we will have to get an exemption from this latter condition.) Will keep you posted. ✓
4. Vertical Assembly Checkout and Transporter Launcher Concept: On May 15, 1962 Harvey Pierce (Connell and Associates) made appresentation concerning "Study of Rail Systems for Vertical Transporter/Launcher Concept" for Launch Complex 39. Several cost saving features were introduced; most important was a new rail bed design which reduced by over one-half the "rule of thumb" cost of about \$1,000 per foot previously assumed. The final report is quite complete and informative; copies of this report have been distributed to personnel concerned with the development of criteria for the mobile system. A copy can be made available to you or a briefing can be presented if you desire. ✓
5. Reference Last Week's Notes on Burttschell: I did not discuss the arrangement with Cortright because Burttschell had indicated to him that he wanted to stay with LOD and would not consider remaining at PMR. Cortright was a man in mind to replace Burttschell, but Evans is the choice of Burttschell.
6. Centaur-Agena: LOD has sent several of its project monitors to San Diego for a Convair conducted school on the Atlas booster. ✓
7. Centaur: Additional motion pictures are available of F-1 which were taken by a hand held 35 mm (80 inch lens) camera aboard an aircraft at 10,000 feet. Reported that they show tank break-up more clearly. Still photos will be available by Thursday. . . AMR has recovered parts and pieces of debris. Will keep you posted. ✓

He is now
"Mr. Centaur"
He must keep him
in this position! B

K.D. ✓
Suggest a briefing package on
barge, crawler and rail transporter.
Please mail down w/Bonnie (after 7 June) B

B5/29

1. USAF/NASA WORKING GROUP ON LAUNCH VEHICLE STRUCTURES: A panel was formed by the USAF/NASA Working Group on Launch Vehicle Structures, with Mr. James R. Scoggins, MSFC, Chairman, to investigate and recommend a wind measuring system for evaluating full scale damping characteristics of vehicles. The instrumentation is to have a frequency response capability of at least 5 cy/sec. This investigation has been completed and a report will be submitted to the Working Group within the next month. ✓

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2. ATMOSPHERIC ACOUSTICAL MEASURING SYSTEM: At the request of Test Division a coordinated program between Aeroballistics Division and Test Division is underway for the early establishment of an atmospheric measuring system and an acoustical measuring system at the Pearl River Test Facility. These systems are to be similar to those presently in existence at MSFC. Aeroballistics Division plans to conduct the atmospheric measuring and prediction portion of this investigation on a contract basis. ✓

3. GD/A CENTAUR TEST FLIGHT F-1 EVALUATION: With reference to F-1 Evaluation Meeting at GD/A attended by Messrs. Lindberg, Reed and Spear of this Division, (see attached note: Geissler - 5-21-62) a committee established by Dr. Seamans under Mr. Fleming was thoroughly briefed. The final official briefing to Headquarters was given by Mr. Hueter on Monday, May 21. ✓

B 5/29

* 1. INTERSTATE 10 HIGHWAY BRIDGE (See NOTES 5-21-62 attached)
In Washington, D. C. on May 21, 1962, a conference attended by Bureau of Public Roads, Corps of Engineers and NASA was held. NASA recommended a 65 foot high bascule bridge (without machinery). With this recommendation was an offer to pay the cost difference between the bascule bridge and the bridge originally planned. The Bureau of Public Roads desires to restudy the cost of a tunnel beneath the canal. For this reason a decision on the NASA proposal was held in abeyance. ✓

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3. VISIT TO WEST COAST CONTRACTORS - It might be worthwhile for you to set aside an hour or so to discuss the highlights of our trip to the West Coast. I think Eberhard would agree that it is a matter of priority to hire a top rated individual to head up the project office at Downey.

4. S-II FACILITIES - Lange will report on this subject.

Yes, by
all means.
Suggest
31 May
after
Staff Luncheon.
B

B 5/29

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gm
D.F. →
Please
see me
re
Downey
Inspection
program.
(discussed
this w/
Filvukh,
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1. QUALITY CONTROL EFFORT OF NAA IN THE S-II PROGRAM: While in the Los Angeles area I visited with the Director of Quality Control (Downey), Mr. Ray Martin, and members of his staff for interpretation of terms in the NASA Quality Publication NPC 200-2. A cursory review of the NAA Quality Program Plan which is just ready for a detailed review by MSFC revealed a commendable effort of NAA to comply with the requirements, a genuine desire to do a good job, and a very good grasp of the technical and managerial problems involved. The detailed review has to follow for verification or correction of this impression. ✓

2. QUALITY CONTROL EFFORT OF DAC IN THE S-IV PROGRAM: While in the Los Angeles area I visited with the Director of Quality Control of DAC, Mr. Buchele, for a discussion on DAC's effort which I consider below par. This is partially caused by the lack of detailed instructions in the contract. Therefore, the NASA Quality Publication NPC 200-2 should be made part of the contract as fast as it can be done. An official request for study of the impact which the incorporation of NPC 200-2 would have on the contract has already been made, and I encouraged Mr. Buchele to take a real positive approach to the problem. I advised against the (standard) reply that this would cost too much money by pointing out that quite a few features of the NPC 200-2 should already be in the present program since they have been spelled out in the contract and that the remainder should only cause a limited and justifiable increase in costs. A different approach would indicate to us that we do not get our money's worth of effort from DAC (which appears to be the case). The situation requires increased attention by this Division. M-SAT
for action
B

3. QUALITY CONTROL EFFORT OF THE AIR FORCE IN THE S-IV PROGRAM: While in the Los Angeles area I visited with the AFPR at DAC, Mr. Dave Jackson, for determination of additional support by this Division. The Air Force has done in the past as good a job as could be done with the limited amount of manpower available. The first contingent of eight people of the planned manpower buildup will be on board this week. Thereafter another assessment concerning temporary support by this Division will be made. The increased effort of the Quality Assurance Division in the past two months (TDY assignment of a total of five engineers, technicians, and inspectors, in the mechanical as well as electrical area to the residence force of three) had been well received by the AF and DAC and has shown good results. ✓

4. AIR FORCE SUPPORT ON S-1C PROGRAM: A visit was made to Air Force Plant Representative Offices, Boeing Company, Seattle, Washington, and Wichita, Kansas. Understanding was reached on general requirements for Air Force support on S-1C Program. Official requests for support will be forwarded to these offices at the appropriate time. ✓

B5/29

1. SINGLE GSE DESIGN GROUP NEEDED WITHIN MSFC. Mr. Fichtner states that such a group is needed to give the necessary direction to S-IC and other contractors. The present arrangement has created a situation which is extremely critical in the area of mechanical and instrumentation GSE. For example, each of the operating divisions (QUAL, TEST, and LOD) is presently responsible for the design and procurement of the instrumentation and mechanical GSE used in their specific areas. The S-IC contractor is thoroughly confused concerning who will direct his efforts in these areas. They are either receiving no inputs or several conflicting inputs.

RUSH → Mac Please hold a preliminary meeting on this subject w/ Fichtner, Mrazek, Grav, Heimburg, Poppel and work out a recommendation for input to MSC.

2. EMERGENCY DETECTION SYSTEM. MSFC Emergency Detection System (EDS) Committee is in need of MSC inputs so that a MSC/MSFC abort philosophy can be established. This philosophy will determine what hardware (if any) must be provided by MSFC and then on what vehicle it can be flown. For SA-5 MSFC has made no provision to give an emergency signal to the space craft in the event of launch vehicle failure (this item to be included in submission to Kuettner for input to notes to MSC). Do Kuettner Please take this up. SB

* 3. TELEMETRY AND TRACKING. Golden of Instrumentation Branch visited MSC 5/16 & 17 to discuss redistribution of telemetry frequencies, tracking aid on SA-5 and SA-6 spacecraft and reduction of Apollo RF links. Need for group coordination on new research projects was stressed by Golden such as digital command system, PCM telemetry and rendezvous radar. MSC and MSFC have agreed that one C-band transponder and one TM link on SA-5 and SA-6 spacecrafts will be operative for at least one orbit. MSFC recommends that this requirement be changed to a Mine-track transmitter or equivalent to simplify tracking requirements. MSFC is considering the need of an aspect sensor possibly located on the space craft and the use of ion gages as this sensor. (this item to be included in submission to Kuettner for input to notes to MSC). ✓

4. STATUS OF 450 STATIC INVERTER. Design engineering has been completed, two prototype units for testing are in production. Testing to commence 6/11/62. ✓

5. PARTS DATA CENTER. ASTR is establishing and implementing this Center to provide maximum information on selection of qualified parts for design. It will have inputs from all NASA centers and prime contractors. Through services provided to these NASA segments, standardization and increased quality and reliability will be achieved. At present the data center has over 8,000 information entries. ✓

6. FUEL CELL R&D CONTRACT. (Reference item #4 notes of 5/14/62 - copy attached) Due to the details involved in explaining reason for the need of an additional contract this subject will be covered by memorandum to be submitted this week. ✓

B 5/29

* 1. S-1-3 ACCEPTANCE FIRING:

Long-duration (118 seconds) firing, 5/24/62, indicates satisfactory performance of stage. Stage will be returned to Manufacturing Engineering Division on 5/31/62. ✓

2. LOX BEARING PROBLEM:

Latest development under this heading, although not necessarily directly connected to LOX pump bearing problem, is the discovery of a loose fuel pump bearing in the gearbox of engine H-1044 (flight spare). There was a clearance of 0.004 inch between the bearing outer race and the bearing seat. Specifications call for an interference fit. ✓

3. REVIEW OF S-IV TEST STANDS AT DAC, SACRAMENTO:

Team findings and Test Division recommendations have been made to Saturn Systems Office. Work required (if DAC were cooperative) should not take over 2-3 weeks at the most. Some electrical GSE is also lacking, so this work is not entirely schedule dictating. ✓

4. MARINE ACTIVITIES:

Barges PROMISE and PALAEMON are in MSFC port. ✓

* 5. MTF S-11 ACCEPTANCE TEST FACILITIES:

Design of S-11 Acceptance Test Facilities at MTF is being delayed by Headquarters pending decision on location between Santa Susana and MTF. Information received that only approximately 30% of design criteria funds (\$100,000) for MTF will be approved now. Several month's delay in remainder is indicated. This could result in delay in these facilities if MTF is finally decided to be the location. The urgency and tight schedules of MTF should justify some risks in the expenditure of funds for advance planning (need approximately \$250,000 additional funds). ✓

6. RIFT FACILITIES (Reference NOTES 5/21/62 Heimborg, Attached):

Discussions with management of Bechtel Corporation were held last week, at which they accepted full responsibility for both technical and financial management deficiencies. Steps which seem to be effective have been taken to improve the technical output and Bechtel has stated that they will, if necessary, bear the full cost of the overrun; however, if justified, the Government may bear ~~a~~ part of this cost. This point is being studied by Procurement & Contracts and Test Division. ✓

ATTACHMENT:

NOTES 5/21/62 Heimborg

NOTES 5-28-62 HOELZER

B5/29

Negative report.

B 5/29

1. CENTAUR:

a. Centaur Program: On Thursday, May 24, word was received from Mr. Vincent Johnson that he and Mr. Cortright concurred in the Light & Medium Vehicles recommendation to fly the second Centaur in January 1963. The F-2 flight plan will remain the same as originally planned. Both Mr. Johnson and Mr. Cortright plan to visit MSFC on May 29 to discuss the balance of the schedule. ✓

b. Fleming Committee Report: Mr. Evans and Mr. Hueter attended the presentation of the Fleming Committee report to Headquarters on Monday, May 21. There were six conclusions presented by the committee relative to the F-1 failure. It is understood that Dr. Seamans will call Dr. von Braun on the results of this report. ✓

c. Centaur F-2: As a result of the investigation of the F-2 tank, it has been decided to substitute the third flight tank for the F-2 tank. This does not have any impact on the recently approved F-2 flight date of January, 1963. ✓

2. AGENA:

a. '64 Mariner (Centaur Backups): Verbal information has been received from NASA Headquarters that the two proposed Atlas-Agena Mariner missions scheduled for March '64 have now been approved. We can expect official authorization to buy, together with the first increment of funds this week. ✓

b. Agenda D Decision: Approval by NASA Headquarters for use of Agenda D is expected this week. Goddard has expressed quite some reluctance for the "D" version, mainly because no one will specifically state that no performance degradation will result in the change. However, they are preparing a letter to Headquarters accepting Agenda D for certain named missions; those where payload vs performance capability is not real close, and where little or no Agenda B engineering effort has been completed. ✓

*
Jm
c. Gemini: Representatives from M-L&M-A visited MSC, Houston, last week to review the Gemini work statement. Agreement was reached on a work statement for MSFC participation in Project Gemini. MSC promised to submit the coordinated work statement by mail this week. ✓

d. '62 Mariner: The '62 Mariner (Atlas Agena-B) program is progressing quite satisfactorily. Flight hardware for the first Mariner launch is either at the Cape or expected within the coming week. Flight hardware for the second launch will be delivered to AMR in late May for the spacecraft and late June for the boosters. The launch period is now limited to 51 days. The Atlas (143-D) for the first launch is "cold" (performance capability a little below nominal) and the second Atlas (179-D) a "hot" bird (somewhat above nominal). At this time everything looks real good for the two Mariner launches. ✓

H.H.

→ Please keep me posted on progress and/or difficulties in the "Centaur Problem Appraisal Program" discussed in my office on 25 May, 3:00 pm. B

B 5/29

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H.H.

→ Please keep me posted on progress and/or difficulties in the "Centaur Problem Appraisal Program" discussed in my office on 25 May, 3:00 pm. B

B5/29

1. MODE EVALUATION

You should expect a rather long dry run next Monday on the presentation to Dr. Shea, a lot of debate, and probably "nit-picking." It would be advisable, perhaps, to have some understanding before that meeting as to which way (method) we can come to a MSFC conclusion and recommendation. A tentative "scoreboard," or list of agreed-upon "system criteria," should be a time-saver as it will help to discourage debate on items which will not have any noticeable influence on the choice of a preferred mode. I am suggesting the establishment of suitable evaluation criteria beforehand, because my experience of the past weeks has been that many hours of a great number of people were wasted and no progress was made, because the wrong things were hotly debated.

If you wish a one-hour meeting on this subject, I am prepared to discuss possible procedures.

2. NEW STAFF MEMBER

I would like you to know that we now have a specialist in "human factors" on our staff. It is Dr. D. Hilchey, who joined us recently from the Quartermaster Corps. He will work with Jim Carter on future requirements for manned space flight. Please feel free to call on him if you need any data or advice. ✓

*Suggest to discuss this between Kuppe
briefing 31 May (morning) and 11:45
when my next engagement comes up*

Bonnie
(RUSH)

96

B5/29

* *gem* 1. Tankage for C-1 Program: This Division's decision to hold the 70" tank contractor completely responsible for his work has proven to be the proper choice. Although these items were under surveillance of Quality Assurance Division's inspection at Chance Vought and accepted; a reinspection by Quality Assurance Division at Marshall revealed discrepancies; therefore, the tanks were returned. Reinspection at Chance Vought revealed that an additional serious discrepancy exists in all tanks produced. A minute amount of copper is being introduced into the tanks, presumably by Chance Vought's deionized water system, resulting in a film of copper on the inside walls of the tanks. Exposure of the inside of the tank to any moisture results in corrosion. Two corrective actions have been taken on this problem. Two deionizers have been installed and the five effected containers are being chemically cleaned with a solution by weight, in deionized water, of 1.8% Ammonium Hydroxide, 0.6% Sodium Meta-Silicate, with the P.H. factor adjusted to 11 with Nitric Acid. One 105" tank has already been cleaned and accepted using this method. Four 70" tanks are now in process of being cleaned. ✓

* *gem* 2. S-1C: The Boeing proposal to use a Y-Ring design for the connection of Bulkhead to Skins had been accepted recently by PGVE. This proposal included the following fabrication process for the Y-Ring: Make ring segments of 5" thick plates; fusion weld these 5" thick ring segments together; machine Y-ring out of this ring. Inherent problem areas in this fabrication process are: (1) Quality of 5" thick weld, using 60 or more passes (2) Warpage of ring after machining (3) Transportation of 33 ft. dia. ring (by water). Boeing will take over this job. We will start in-house with the following parallel approach: Make ring segments of 5" plates (by Boeing); machine Y-ring segments out of these (Boeing); ship fully machined Y-ring segments to MSFC; weld machined segments into a Y-ring by use of the Electron Beam Welding Process (MSFC). We selected Sciaky Brothers to design and fabricate the vacuum chamber (4' x 4' x 4') and related equipment including the E.B. Gun. ✓

3. Boeing Contract: The first task order assignment on the amendment to the Boeing contract has been initiated. ✓

From Michoud to Huntsville?

B

B 5/29

1. Funding: Firm cost proposals were received from Chrysler for the S-I work amounting to \$276,477,788. - and from NAA on the S-II development for \$357,870,651. Boeing notified MSFC of an anticipated over-run of \$.972 in FY-62.

The problem regarding S-II facilities has been resolved by MSFC agreeing to FY-63 funding in the first week of July and Navy requesting bids without funds in their hands. This change in MSFC's position was caused by NAA slip in the A&E design. The Navy can still produce on time in spite of the one month schedule squeeze. ✓

2. C-1:

SA-3 - Successful completion of full duration test on 5-24-62 will result in transfer of booster to M-ME & shipment to AMR 8-24-62 on schedule. ✓

SA-4 - S-I sent to M-QUAL on 5-28-62, two weeks early. Schedule may slip if certain missions added, such as hydrogen venting or S-IV blowout panels. ✓

SA-5 - Start of assembly now forecast for 6-25-62, i.e. four weeks late. Revised assembly plan, use of overtime and second-shifting can keep transfer to M-QUAL on schedule. Delay due to late completion of tail section and late receipt of acceptable propellant containers from Chance Vought. ✓

S-IV - DAC engineering and production personnel studying common bulkhead production and handling procedures. This is the first penetration into production by the DAC engineering Department. !! ✓

Schedules - DAC studies additional safety features for the Battleship stand prior to cold flow tests. Cold flow scheduled to begin the week of 6-11-62, and hot firing one week later. Common bulkhead problems cause DAC to double-shift six days a week, to retain original schedule for all systems and SA-5. ✓

3. C-5:

S-IC - On 5-24-62 P&C was instructed to inform Boeing that no additional FY-62 funds are available to support the contract beyond those already provided. Boeing was instructed to maintain the total direct and indirect manpower at present levels and to refrain from further manpower build-up. Relocation expenses and procurement of weld head assemblies should be deferred.

The MSFC/Boeing Program Development Plan is being revised and updated. Plan is scheduled for completion 6-10-62. ✓

S-II - NAA stated that additional GSE cost beyond submitted proposal will be furnished late in June prior to negotiation. Would like to see it! B (Don't delay)

An engineering design review is scheduled for 6-13-62 in the Dir. Conf Room 9:00 a.m., when NAA will also justify the present cost proposal and the differential from the original cost. Will attend. B

S-IVB - On 5-23-62 DAC presented results of investigation to use Rocketdyne facilities for development and test of S-IVB. Use of these facilities does not appear advantageous over Sacramento. This matter is being further explored. ✓

4. APOLLO - Pad 39 umbilical tower requirements were being studied by two reps. from MSC (POD, Cape), NAA, and LOD, Huntsville, throughout last week. MSC rep. will brief MSC, Houston, over the weekend on possible "downgrading" of pad checkout requirements for APOLLO and modification of Apollo contract ground rules before Management Council meets. Outcome unknown at this time. Made some progress w/ MSC

Members of Sloan's staff have started to attend MSC-MSFC panel meetings. APOLLO crew will fly head down during tilt program prior to injection, according to latest information. ?

O.L.
What's the status of DAC's implementation of our Procedure's Committee recommendations? Wereht you preparing a letter to Able for my sign. B

Dr. von Braun's Comments to Notes 5-14-62

→ Sounds good
to me B

1. M-SAT suggests that the "MSFC/Boeing Development Review" be presented to M-DIR on June 18, 1962. Possible interference with presentation to MSC on June 19, 1962 is still under study, and may affect plans. ✓

2. Status summary regarding Boeing contract for Fabrication Services in support of ME in-house program was furnished in writing on 5-22-62 to Office of the Director, and the Task Order approval has been given to M-Michoud. ✓

B5-29

1. NASA AGENCY-WIDE MANAGEMENT CODING STRUCTURE - Discussions continued last week between Messrs. Andressen, Goodrum and Hardeman of MSFC, and Al Little and Wally Velander of OMSF on coding structure. Improvements effected are:

- (a) Uniform systems code designation for each of various stages and engines. ✓
- (b) Use of same sub-system codes by OART and OMSF in technology area. ✓
- (c) Elimination of the breakout under the systems code to designate contractors. We will use separate code. ✓
- (d) Elimination of breakout under the systems code to designate fabrications and engineering. We will use our present object class code. ✓
- (e) Use of the same breakdown for operational vehicles as for development vehicles. ✓

Discussions are continuing between Office of Programs and the various program offices to attempt to firm up the code soon. Receipt any time after June 1 places a burden on the Center. ✓

2. MANNED LUNAR LANDING MODE - Joe de Fries' Lunar Orbit Rendezvous Working Group met Friday to consolidate LOR Mode data into a single complete package suitable for use in presentations or as a basic document in preparation of a formal program. General agreement was reached and most topics were settled. The only unsettled subject is the lunar descent and ascent guidance and error analysis. This will be taken up again today. ✓

Dr. Geissler, Mr. Williams, Mr. Koelle and Mr. de Fries met Friday (May 25) to develop meaningful and significant comparison of the four lunar landing mission modes. Mr. Koelle's work was discussed in detail. The efforts to put all available material into perspective for the presentation to you on June 4th will continue this week. ✓

According to statement of work, STL in their study for direct mission will consider either C-5, SATURN C-8, or NOVA. In case of C-5, extensive modifications to the present spacecraft design will have to be considered. ✓

B 5/29

1. FY-63 C-1 SERVICES PROGRAM: This Division has been given the indication by M-SAT that the maximum number of Chrysler personnel available to P&VE will be 220. The requirements for FY-63 is 320 average for the year. This means an approximate 30% reduction in support which will have serious effects upon the documentation release schedules. ✓

2. RIFT: a. RIFT pre-contract negotiation meetings were held with Lockheed at Sunnyvale. So far, Lockheed seems to be in complete agreement with MSFC's proposed method and philosophy of contracting. ✓

b. Headquarters indicates that RIFT R&D funding level for FY 63 may be as low as \$10 million as compared with \$25 million programmed. Reduction apparently based upon some skepticism of NERVA engine progress. Effect on RIFT will be to keep program in level-effort design phase. ✓

Bechtel is going all-out to overcome problems caused by apparent earlier mismanagement of RIFT Conceptual Design Study work. They have asked for a one-month extension to contract (until 7-3-62) in order to improve quality of reports. ✓

Lockheed operates the USAF's Georgia Nuclear Laboratory at Dawsonville and proposed the reactor facility to support RIFT. USAF is in process of giving the facility to GSA for disposal. Lockheed now has a one year lease from the USAF. We are investigating the possibility of either a Lockheed long term lease from GSA or a transfer of the facility to NASA for direct lease to Lockheed. ✓

Lockheed is preparing a facilities manufacturing plan for RIFT stages using a Moffett Naval Air Station blimp hangar. Although the CO of the NAS has authority to negotiate with NASA for possible use of space, more definitive high-level agreement is needed between NASA and the Navy. So far this has been primarily a Lockheed action. ✓

3. BOEING PERSONNEL: Number on board in P&VE Division as of 5-25-62: 295. 40 of these (temporary-type) pull out 5-28-62 without any prewarning. *Team spirit? - B*

4. LH₂ Properties Standardization: A critical review of all available properties of H₂ has been underway as a result of differences in base values being employed by the various Saturn contractors. This review has been by complex chemical thermodynamic analyses of information obtained from literature, personal contacts with contractors, and the National Bureau of Standards. The Engineering Materials Branch participated heavily in a recent industry and government wide meeting (at NBS and sponsored by SNPO) to study this problem. As a result of these efforts, a set of thermodynamic properties of LH₂ has been recommended to M-SAT to serve as standard values for all SATURN contractors. Transport properties of H₂ are now being evaluated similarly. ✓

4. PROPELLANT TANKS FOR SA-5: The first 6 or 7 propellant tanks fabricated by Chance Vought, for the SA-5 Vehicle were contaminated with copper. This copper, which is not visible in all cases, would create a serious corrosion problem if allowed to remain any length of time in the tanks. This condition was discovered because of the corrosion that had already started.

The exact cause of the contamination has not been established, but two representatives of M-P&VE-M are at the contractor's plant investigating the situation. It has been established that the contractor used boiler distillate rather than deionized water for rinsing the tanks. This distillate, from brass condenser tubes, traveled approximately 1900 feet through a copper line to the test stand and has been analyzed to have a copper content of as much as 0.4 ppm. The industrial water used for hydrostatic testing contains about 550 ppm of chloride ion. Thus, the ingredients for copper plating are present. A procedure has been selected to remove copper from the contaminated tanks and this requires about 24 hours of flushing and removal of other copper items (probes, etc.) which have been installed in the tank. *B*

5. S-IVB: See attachment par. 8. *(Her name is Bonnie, Jan)*

B5/29

Mission Plans & Schedules:

I mentioned in my previous notes that Payne and Sneed of my office assisted Doug Lord - Shea's Assistant Director for Mission Planning - in preparing optimistic plans and schedules for each of the Lunar Mission Modes under consideration.

These optimistic plans and schedules were to be sent to the Centers for comments. As of today they have not been received at your Central Planning Office.

It seems possible that Shea will hand them out at tomorrow's Management Council Meeting.

In the meantime, Doug Lord has requested that we work up conservative schedules for the various modes. Shea has stipulated that we use the Golovin Report as basis for the exercise.

D.R.

He showed them on the screen and I think he brought hand-outs along. I have none, though. Please ask Rees whether he got 'em.

B

35/29

Mac
Follow
up?
B

1. RESEARCH INSTITUTE: The University of Alabama proposal for a \$3.3 million three year grant for the Research Institute has been forwarded to various people in Headquarters, with ten copies to Dr. T. L. K. Small. Five of the seven research contracts planned with the Institute are now at the University awaiting signature. ✓

2. UNIVERSITY OF ALABAMA RESEARCH CAPABILITIES: Dr. Shelton, Mr. Miles, and Mr. Thompson visited the University of Alabama, together with members of Midwest Research Institute who are presently surveying the research capabilities of institutions in the South for the Office of Applications. It seems that the impression given by the University was satisfactory. The University will compile a written report on its capabilities, then forward it to RPD for review prior to submission to Midwest and then to the Office of Applications. ✓

35/20

1. F-1 ENGINE PROGRAM: Testing of the F-1 Engine System has increased. There have been several attempts this week for full duration runs which were terminated by observers due to apparent facility deficiencies. On 5-22-62, engine #007 ran 40.6 seconds of a scheduled 40 second run. All results good. On 5-23-62, engine #004 ran 125 seconds of a scheduled 150 second run. Observers terminated due to a LOX leak in the bootstrap line bellows. On 5-24-62, engine #007 ran 38.4 seconds of a scheduled 150 second run. Observer terminated due to the fuel balance cavity pressure exceeding the red line on instrumentation. Instrumentation is suspected to be at fault. ✓
2. J-2 ENGINE PROGRAM: A letter to the Procurement and Contracts Office to initiate a change to NAS8-19 for a 500 second run capability was forwarded 5-24-62. ✓
- * 3. H-1 ENGINE PROGRAM: As a result of the recent bearing problems, Rocketdyna is making good progress in developing a system whereby turbopump bearings can be checked without disassembly of the gearbox. This system uses a stethoscope, audio amplifier and tape recorder. ✓
- * 4. RL10A-3 ENGINE PROGRAM: The initiation of the RL10A-3 Engine Preliminary Flight Rating Test is imminent. There may be a short delay while a problem pertaining to the ten second LOX cooldown (at SATURN S-IV inlet conditions) is resolved. A throttling kit is being prepared by Pratt and Whitney Aircraft for forwarding to Lewis Research Center. Lewis Research Center will initiate an RL10A-3 engine throttling program as soon as the gimbaling tests are complete. ✓
5. M-1 ENGINE PROGRAM: The first M-1 "wedge" thrust chamber test was conducted this week and results are being evaluated. ✓
6. 100" DIAMETER SOLID MOTOR: Aerojet will test FW-3 (their largest solid motor currently under contract) on 6-9-62. The motor has five (5) center segments plus head and nozzle end segments containing 314,850 pounds of propellant. Predicted performance: Burning time 120 sec.; Maximum thrust 644,000 pounds; Avg thrust 586,000 pounds; Total impulse 71×10^6 pound-secs. ✓
7. 120" DIAMETER SOLID MOTOR: United Technology Corporation (UTC) was announced as the successful bidder for the Titan III 120" motor development program. ✓
8. 156" and 260" DIAMETER SOLID MOTORS: The RFQ's for these motors have not been released but are expected soon. Headquarters has asked if we would assist in the technical evaluation of the proposals; answer, "yes" subject to management approval.

yes B